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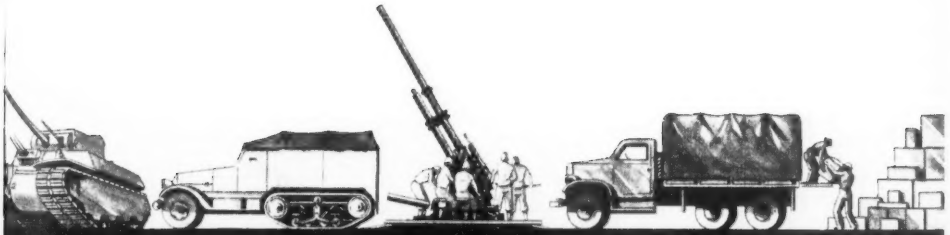

COMMAND AND GENERAL STAFF SCHOOL

FORT LEAVENWORTH, KANSAS

•

A MONTHLY REVIEW OF MILITARY LITERATURE

COMMAND AND GENERAL STAFF SCHOOL
OFFICE OF THE COMMANDANT

ORDERS TO LEAVENWORTH

Many an officer has asked for "orders to Leavenworth," and been happy, indeed, to get them. Now, Leavenworth is asking for orders, in her turn, and will be most grateful to you if you will send them. The Old School is asking you.

All officers who are in a position to do so can render a special service NOW to the Army and the School by contributing items of practical value to the Archives. The types of material particularly desired are extra or surplus copies of original field orders, administrative orders, staff studies, plans, and any and all operations instructions, supply and evacuation procedures, reports, statistics, historical records, and similar documents issued by divisions, corps, armies, and comparable headquarters--air and service, by task force and allied headquarters--anything that can enhance the value of instruction now and, in connection with research, improve its practical usefulness during future years. Unit histories are welcome, of course; but the special interest of the School lies in the other documents that were issued during campaign and especially during battle. Care should be taken, however, not to remove from an organization's files documents which form an integral part of those files.

Contributions have already begun coming in; all are promptly and gratefully acknowledged. The Archives of the Command and General Staff School will soon have a new building for its own purposes, and there will be ample security and room for use and storage of every document that becomes available. The Army and the School have never before realized so great an opportunity to vitalize instruction during years of peace on the basis of practical experience brought directly from the battlefields of the world and from all activities supporting the world battle. Your special interest and prompt action are therefore invited at this time.

KARL TRUESDELL
Major General, U.S.A.
Commandant

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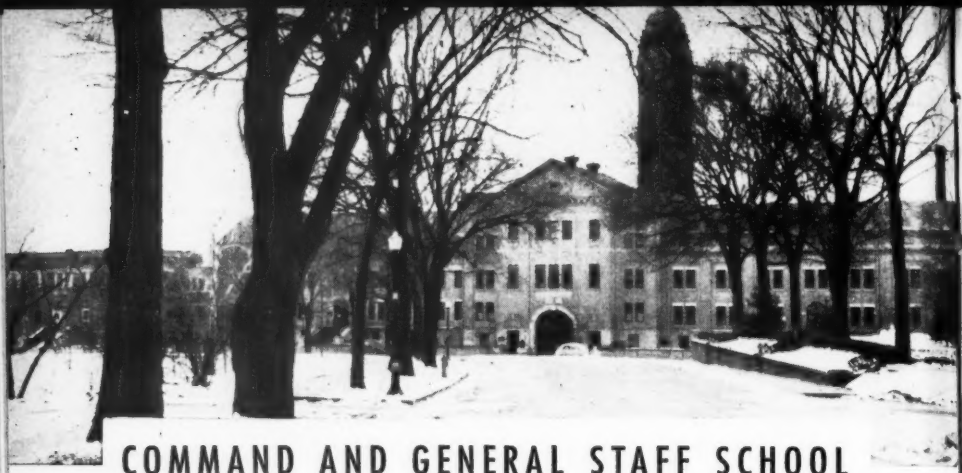

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Malaria Control in the Pacific

MAJOR GENERAL NORMAN T. KIRK
The Surgeon General, United States Army

MALARIA has always been a scourge of the tropical regions of the world, but not until this global war have its devastations been brought so forcefully to the attention of people of this country. The year 1942 was a critical one for the Army with respect to tropical diseases. In the South and Southwest Pacific areas, malaria was an acute problem. Because of the urgency of the military situation, the early campaigns in New Guinea and the Solomons were fought with inadequate antimalarial supplies and without proper preparation to control mosquitoes. A high noneffective rate from malaria resulted, and for a period of some months whole divisions were incapacitated by the disease. It was conceivable that mosquitoes alone might accomplish what the Jap banzai charges failed to achieve. For a time casualties from malaria in the Pacific were eight times those from Jap action. It therefore became urgently necessary to set up an organization of specially trained personnel to study and combat this disease which so seriously threatened the military effectiveness of our forces in the field.

By December 1942 a special malaria control organization was established in the Medical Department to assist commanders in the discharge of their responsibility for malaria control and to augment the carrying out of mosquito control measures in oversea theaters. This organization consists of specially trained malariologists, malaria survey units, and malaria control units. A Chief Malariologist was appointed in each theater of operation in which malaria was a problem. These malariologists planned and supervised the malaria control program and acted as liaison officers between higher headquarters and the malaria survey and control units in the field.

Malaria control units consist of small mobile teams commanded by a Sanitary Corps officer specially qualified in sanitary engineering and malaria control. The survey units are likewise small teams somewhat like a mobile laboratory. They are supervised by two Sanitary Corps officers, one an entomologist with special training in mosquito identification and malaria field survey, the other a parasitologist trained in laboratory and field procedures in malaria surveys such as blood examination for malaria parasites. The survey units are charged with the responsibility of searching out and finding the malaria-carrying mosquito and the amount and type of malaria present in the native population. These findings, made available to the malaria control units, enable them to set up and carry through efficiently the control measures indicated for an endemic area. By February 1943 this organization began to function in the field in the Pacific. Remarkable feats were accomplished in establishing mosquito control in base areas. In many places these operations were extended to include forward combat zones.

Under conditions of combat, however, it is not often possible to carry out mosquito control measures, such as draining and larviciding, which prove so effective at base installations. In the front lines men must use individual preventive measures to protect themselves from malaria. These include the wearing of protective clothing, the use of sleeping nets and insect repellent, and the taking of drugs which repress the symptons of malaria if infection occurs despite all precautions. Since the efficiency of these measures depends upon the cooperation of the men themselves, troops must be trained and indoctrinated in malaria control.

In the Pacific, schools were established to give special training, and line officers were made thoroughly aware of their responsibility in maintaining malaria discipline in their units. Radio "plugs" on the jungle network helped to sell malaria control to the GI. Roadside billboads with luscious pin-up damsels were made, painted and

erected by the antimalaria units to attract attention to the malaria warning carried by the sign. These signs and posters, lectures, and radio appeals were all used to educate every man to the dangers of malaria and the best methods which he could use to protect himself.

In highly malarious regions, atabrine taken regularly in small doses has proved to be an extremely useful agent for preventing sickness from malaria and thus maintaining military effectiveness. It was soon learned that good discipline enforced by command authority was essential for the success of drug suppressive treatment. When discipline is good and all men take their atabrine tablets as ordered, the malaria rate drops to a negligible figure. It must be emphasized, however, that the taking of suppressive medication is not a true malaria preventive measure. It is merely a means of postponing symptoms of illness if infection occurs. Mosquito control measures have been pressed vigorously even though a suppressive drug such as atabrine is being taken. When the risk of infection is sufficiently great to necessitate the use of suppressive treatment, it becomes all the more important to control malaria-carrying mosquitoes, the idea being to reduce all hazards to a minimum.

The ravages of malaria in a military force which must operate in the tropics without benefit of full protection from mosquitoes is well illustrated by the experience of a division which fought on Guadalcanal during late 1942 and early 1943. Adequate antimalarial supplies and trained personnel for mosquito control were not available during this campaign. Mosquitos were abundant, and numerous carriers of malaria parasites were to be found among the Japs and the native population. Conditions were ideal for spread of infection to our troops. During the fighting, the sickness rate from malaria in this division was approximately 1,000 per thousand men per annum in spite of the fact that suppressive drugs were used. Even though discipline in taking medication was poor, much sickness must have been prevented, for later on when the division was evacuated to a non-malarious island and the drug was stopped, weekly malaria rates rose as high as 14,000 per thousand men per annum. Six months later, notwithstanding the fact that there was no further exposure to the disease, the malaria rate was still 4,000 per thousand per annum because of frequent relapses. It became necessary to institute suppressive treatment to prevent further sickness and to enable ths division to return to combat. With good atabrine discipline the malaria rate dropped to less than fifty per thousand per annum, and fighting effectiveness was maintained.

The situation in regard to malaria in the Pacific has improved vastly since these early campaigns even though operations have continued in highly malarious regions. Malaria rates have dropped dramatically since their peak in the middle of 1943. Losses from malaria have now been reduced to a point where they no longer have significant influence on military operations. In the year 1943 malaria was responsible for twenty-six percent of the man-days lost because of sickness in the Southwest Pacific. In 1944 only five percent of the days lost from disease were due to malaria. The theater malaria rate in 1943 was 245 per thousand per annum. For the year 1944 it was less than sixty, and in some recent months it has been under forty. Hospitals which were once crowded with malaria patients now have comparatively few cases of the disease to treat.

The campaign to control malaria was not an easy one. It was often carried out under difficult and trying conditions. The supply problem, for instance, was sometimes very acute. Roads were scarce. They were frequently impassable. Traffic movement was nearly always greater than the road facilities. Antimalarial supplies had to have high priority in order to reach the places where they were urgently needed. Equipment for spraying larvicides often had to be improvised from what was available.

Man-made malaria dogs the footsteps of an army in the tropics. In tropical cam-

paigns, because of the warm climate, the mosquito-borne diseases attain great military importance because weather conditions favor the breeding of large numbers of mosquitoes the year round. In addition, the malaria-ridden native population serves as a reservoir of infection. Water-logged slit trenches, dugouts, and abandoned gun emplacements, together with shell craters, wheel ruts, and borrow pits all contribute to a great increase in the number of places mosquitoes can breed. The army in the field literally tears up the earth, and it is up to the malaria control organization to keep the scars of battle from becoming sources of malaria-carrying mosquitoes.

To combat the tiny mosquito the malaria control units have needed giant equipment, such as bulldozers and draglines. In grading and filling water-holding depressions where mosquitoes can breed, the bulldozer proved to be a perfect tool; draglines were useful to dig the ditches which were necessary to drain off large accumulations of water. Whole swamps were eliminated with this engineering equipment.

Manpower was also essential for control work in the field, which often was a back-breaking job. Knapsack containers strapped on the back were used to spray oil on every collection of water down to the circumference of a watch crystal. Slow-moving streams choked with vegetation were cleaned out, sometimes by very primitive means. Men, materials, and vehicles had to get to the job through mud and torrential rains. The training of new gangs of native labor each week, sometimes even at daily intervals, was a drain on patience. Add to these tasks the everyday problems of housing, feeding, and protecting these men from disease and from Japanese action and one gains some idea of the problems the malaria control men had to face. These units carry malaria control to the front lines and they are there on D-day with the beachhead landing parties. Although the malaria units are not combat troops in the shooting sense, they do fight a battle against the disabling enemy, disease.

The greatest new technical aid for malaria control developed during the war is DDT, the powerful chemical insecticide. The discovery of the insect-killing properties of DDT is one of the outstanding recent contributions to the entire field of preventive medicine. Small amounts of DDT now produce better insect killing rates than did gallons of oil plus other insecticides. This means less bulk and weight to ship, transport by truck, or carry by hand. Reduction in shipping weight is a great boon to supply services in forward areas. Airplane spraying of DDT oil solutions, one of the most dramatic malaria control measures developed, is now used for large-scale area treatment. Airplane spraying has proved most useful in battle zones where the military situation precludes standard methods of mosquito control. Adult mosquitoes which might transmit malaria to our invading soldiers are killed off by the spray treatment which is also effective in destroying larval stages of the mosquito.

The great progress which has been made in the control of malaria in the Pacific represents an accomplishment of high importance in our war against Japan. In this connection it is appropriate to quote a statement by Brigadier General Guy B. Denit, Chief Surgeon in the Southwest Pacific, which was published in the theater malaria news letter, 25 December 1944:

"The reduction of the malaria attack rate in this theater to a point at which it no longer constitutes a dangerous handicap to our military effort is an achievement of historical importance in preventive medicine. It has been the result of a joint effort which is to the great credit of all who have participated. In this accomplishment the malariologists and the malaria survey and malaria control units have played the major role. Despite hardships and often danger, their achievements have been notable. The Medical Department is proud of your initiative and perserverance, of your professional contributions, and of the striking success of your efforts. As Chief Surgeon, I express my deep appreciation of your past service and my

confidence in your ability to meet the new tasks that lie ahead."

Control of malaria requires unremitting attention. It is not a problem that can be solved and then forgotten. Continuous effort must be made to maintain environmental mosquito control and to keep malaria discipline among troops at a high level. The remainder of the war will be fought largely in malarious territory. Our experiences with malaria in the Pacific exemplify the ravages which the disease can cause in military forces when uncontrolled, and, more important, the success in prevention which can be attained. These lessons will be applied in the campaigns which still confront us.

Operation Pluto

From a British source.

FROM 12 August 1944 to 8 May 1945 about 120,000,000 gallons of gasoline reached the Anglo-American armies via the pipeline system laid under the English Channel by British engineers in cooperation with the British Navy. Operation Pluto, as this enterprise was called, guaranteed uninterrupted delivery of bulk petroleum (which usually needs a special harbor and dock and extensive storage facilities) across the beaches, making it invulnerable from air, surface, or submarine attack, and completely independent of the weather.

It was Admiral Mountbatten, then head of Combined Operations, who in April 1942 asked the Ministry of Fuel and Power if an oil pipeline could be laid across the Channel. The experts were doubtful, but A. C. Hartley, Chief Engineer of the Anglo-Iranian Oil Company, who used three-inch high-pressure pipelines in Persia, suggested a pipeline something like a submarine electric power cable without cores and insulation, which could be laid across the Channel in a few hours from cable-laying ships. By working daily and nightly over two week-ends, technicians completed the full-scale order for several hundreds of yards of this pipeline to be laid in the Thames from a cableship lent by the British Post Office. The results were successful, and Mr. Churchill approved the scheme, and two thirty-mile lengths of cable were ordered to the original two-inch diameter (subsequently increased to three inches and strengthened for working pressures in excess of 1,200 pounds per square inch) so that full-scale trials could be held. Eight months after Hartley's idea originated, the experimental cable was laid by a vessel which had been fitted with gear for transporting this unusually heavy cable, and gasoline was delivered across the Bristol Channel. The fact that the cable was hollow increased the difficulties since it was liable to kink and so stop the oil flow, so the cables were laid full of water, which kept them inflated. This pipeline was called the HAIS (Hartley-Anglo-Iranian-Siemens).

After the successful trials of the HAIS cable in April 1943, Force Pluto was formed composed of ships of all sizes from 10,000 tonners down to barges and motorboats. The force numbered 100 officers and 1,000 men.

Operation Pluto began as soon as the mines had been swept to the approaches to the tip of Cherbourg Peninsula. Men of the Royal Army Service Corps pumped oil to cleverly concealed pumping stations on the French coast, frequently in rough weather, having to wade up to their necks to bring in the end of the line from the ships. A Royal Army Service Corps petroleum unit also maintained direct contact with the French terminals by cross-Channel wireless telephone, thereby instantly detecting and reporting variations in the quantities delivered.

Notes of a Division Commander

MAJOR GENERAL J. L. BRADLEY
Commanding General, 96th Division

THE following notes are based on fighting the Japanese on Leyte and Okinawa. Both of these were island operations, and this might, to some extent, have influenced the Japanese tactics. However, it is believed that they will generally follow the same pattern on a large land mass.

As a rule, you cannot maneuver the Jap out of position. The greater part of his force will fight on the position until they are killed. However, he does not like to be outflanked, and approaches from the flank are often more weakly defended. It is true that in the Okinawa campaign he withdrew from the Shuri position as he was being doubly enveloped. However, in my opinion, the withdrawal was made in order to prolong the campaign and not because of the envelopment. He did not withdraw from the Yaeju-Dake position, his last, when it was almost completely encircled, but continued to reinforce it and fought there to the end. We used to end our problem too soon at Leavenworth. A completed encirclement or envelopment does not end the battle when you are fighting Japanese.

When completely dug in or when fighting from caves, as in Okinawa, you cannot shoot or bomb him out of position. In fact, often you cannot even neutralize his fire with artillery fire. The infantry must close with him and rout him out with explosives and flame throwers. Direct fire weapons, tanks, and flame-throwing tanks are necessary and invaluable.

Inability to locate Japanese machine guns and snipers due to their flashless and truly smokeless powder gives them a material advantage. Most of the small-arms fire is done at a range of one hundred yards or less. At these ranges, Japanese markmanship is good.

It is often as difficult to advance down a reverse slope as it was to take the forward slope. The Jap will have caves and pillboxes on the reverse slope facing to his rear, in which he has emplaced machine guns, antitank weapons, artillery, and mortars. He is likely to let you pass down the slope and then open up on your back.

It has been rather easy to occupy limited objectives by carefully planned night attacks. The difficult part is to remain on the objective after it is occupied. The Jap will open up on the position with everything he has, including the weapons you have bypassed in the dark. Reserves must be available to start at daylight and mop up all bypassed resistance.

Japs in the open, i.e., attacking, are easy to handle. Seasoned troops should welcome an attack at any time. The Jap is apt to make successive attacks at the same point until all of his troops are killed.

Japs plant mines without any regard to pattern, rhyme, or reason. They may be found anywhere and are usually well concealed.

Tanks must be given close infantry support to prevent them from being destroyed by satchel charges, by mines pulled or pushed into their paths, or by suicide attacks. At times, this protection can be given by artillery time fire or by machine-gun fire but neither is as effective as accompanying infantry.

The Jap does not like heat and flame. Flame throwers are most effective. At times, he can be forced to evacuate positions by mortars or artillery firing white phosphorus when no apparent results have been obtained by high explosives. The Jap's artillery is comparatively ineffective. He very seldom masses the fire of more than four pieces. He requires a considerable period of time to locate and adjust fire on new targets. He is usually methodical in firing his artillery and will cover the same area day after day at the same hour and with the same number of rounds.

The Jap is "dumb" and can be outwitted. He is inferior to our soldiers in every respect and is apt to go to pieces if confronted with an unexpected situation. However, he will fight until death and you can never

afford to be careless. He does not respect the rules of land warfare and is cruel and inhumane in every respect. It is necessary to treat flags of truce or apparent surrenders with suspicion. Japs carrying white flags or other means indicating surrender may approach, and, if our troops expose themselves, drop to the ground to uncover the fire of Japanese machine guns to their rear or flank. One of his favorite targets is litter bearers carrying wounded, or aid men caring for casualties. The wearing of civilian clothes by Japanese soldiers is common.

One of the Jap's principal ideas is to inflict as many casualties upon us as is possible, without regard to the means employed or the casualties he may incur. We must always be on the lookout for his machine guns or snipers placed in localities which will give him no tactical advantage.

Rockets in Aerial Warfare

From *The Sphere* (Great Britain) 17 March 1945.

THE rocket projectile fired by Mosquitoes and Beaufighters is one of the most revolutionary weapons ever produced in aerial warfare. The terror of enemy seamen, the value of the rocket lies in its unfailing accuracy and its devastating effect. It is essentially a precision weapon. The chief difficulty has hitherto lain in ascertaining results. Cannon and machine-gun fire can be seen striking a ship, but when a rocket registers a hit, the results cannot be observed until after the aircraft has left. There is now ample proof that the rocket not only smashes through the hull of a ship, but also crashes through anything on its way, such as machinery or cargo, and often comes out the other side. And, almost invariably, the rocket fires the ship, which, blazing from stem to stern, sinks when water pours through the gaping holes in the hull. During the Bay of Biscay battles with shipping, a squadron of Beaufighters used to provide anti-flak cover to the rocket-firing aircraft. Today, however, the rocket-firing aircraft provide their own anti-flak. While the pilot aims his cannon to kill the gunners and silence the flak, he simultaneously fires the rockets, which score under-water hits.

A high degree of flying skill, combined with indomitable courage, is demanded from air crews. At a speed of over 300 miles an hour, the aircraft dives from 1,500 to 200 feet. The flying must be accurate in every detail. Skidding or turning would negative the result of the attack. Saturation attacks—several aircraft firing at the same time—swamp the enemy gunners. But the greatest danger is from waiting enemy fighters, pouncing when Mosquitoes and Beaufighters have exhausted their ammunition on the ships and have broken formation. To foil the enemy, the strike aircraft operate with fighter cover.

Two main types of warhead are used on the rockets—the twenty-five pound solid armor-piercing head, and the semi-armor-piercing sixty-pound high-explosive head fired against ground targets, such as tanks, gun sites, and buildings. The latter, which can be used as anti-flak against shipping, has the same effect as the shell from a six-inch naval gun. Each aircraft carries eight rockets—fired electrically from four rails under each wing—and a salvo is the equivalent of a broadside from a light cruiser. How this has revolutionized the war at sea can easily be seen, for whereas a cruiser normally fires at its targets from a range of two to five miles, a rocket-firing aircraft can register hits from 400 to 500 yards.

"What About Night Photography?"

LIEUTENANT COLONEL JOHN L. McQUIGG, *Air Corps*
Instructor, Command and General Staff School

SO much has been said, and written, about night aerial reconnaissance—its possibilities, successes, failures, and hopes for the future—that a clear statement of the capabilities and limitations of this new source of enemy information is appropriate.

Unfortunately, all too much of the information (or misinformation) on night photographic reconnaissance is of the Buck Rogers variety, coming from the columns of *Flying Aces*, *Popular Mechanics*, and magazines of that ilk, and dealing with infra-red film, color photography, and other equipment of the future. Looked at from those views, the picture is too optimistic.

On the other hand, requesters of such photography, without proper consideration of its limitations or knowledge of its uses, have been dissatisfied with results and have given circulation to a belief that night photography from the air is a usable impossibility.

Somewhere between the two extremes, at its present state of development, lies the true story.

From the beginning, the whole idea of night reconnaissance has exercised a considerable pull on the imagination. The ability to penetrate the enemy's cloak of darkness, the whole procedure of taking pictures by automatic camera and huge flash bombs, the invasion of hostile territory at night and alone—all have a romantic appeal not present in other sources of enemy information.

And this appeal is not without foundation. It is no secret that daylight photo reconnaissance has had an almost fantastic development during this war. Some experts claim the great majority of military intelligence either comes from, or is verified through, the work of our aerial spies. Whatever the exact percentage may be, it is certain that photo reconnaissance has contributed much to our defeat of the enemy. Armies do not move without it. Air forces require it to assess bomb damage and select camouflaged targets to bomb. Without it, much of our information on air order of battle, troop movements, enemy defenses, and industrial production would remain unknown or would be learned a far more costly way.

Yet up to now, generally speaking, the enemy has enjoyed virtual immunity from this aerial spying for twelve hours out of every twenty-four. Important moves, unusual construction, secret developments, could be worked on at night, then camouflaged during the day.

At its present state of development, night reconnaissance does not remove this protecting cloak of darkness, yet it is a step in that direction, and holds every promise of important developments for the future.

Probably night reconnaissance can never be used on the scale of day reconnaissance. Too many natural obstacles stand in the way. But for keeping effective watch on enemy supply lines, railroad yards, ports and harbors, defensive strongpoints—in short, covering any pinpoints that can be specifically located on the map—night reconnaissance can play and is playing a vital role in supplementing daytime surveillance.

Probably the best understanding of night reconnaissance can be gained by briefly reviewing the development and use of the weapon in the Mediterranean Theater, where the most consistent experimentation and combat use was carried out by Colonel Karl L. ("Pop") Polifka's Mediterranean Allied Photo Reconnaissance Wing (MAPRW).

Night reconnaissance was not new when this organization flew its first sorties back in the summer of 1943. It had been experimented with at Wright and Eglin Fields in the United States. The RAF had flown a good many combat hours in the European Theater. The U.S. Navy and the Seventh Air Force had flown some very valuable sorties in the far Pacific.

But in those cases it was an expedient, an experiment. Various United States officers

were interested, but no one had really tackled the problem from an operational standpoint.

During the invasion and following battle of Sicily, MAPRW decided that night reconnaissance could play an important part in supplying additional information *if*—and it was a big "if"—the technical problems could be whipped.

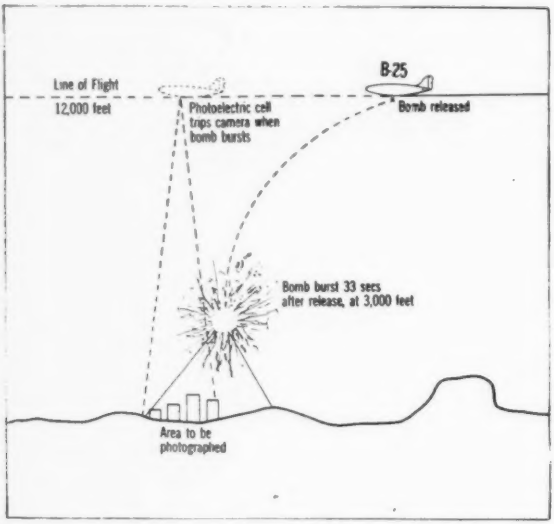
B-25
Line of Flight
12,000 feet
Photoelectric cell trips camera when bomb bursts
Bomb released
Bomb burst 33 secs after release, at 3,000 feet
Area to be photographed

FIGURE 1.

SCHEMATIC DRAWING OF NIGHT PHOTOGRAPHY WITH FLASH BOMBS. BOMB IS DROPPED AT 12,000 FEET, FUZED TO BURST IN THIRTY-THREE SECONDS. AIRCRAFT CONTINUES ON FLIGHT LINE, PHOTO ELECTRIC CELL TRIPPING CAMERA WHEN BOMB BURSTS. DIFFERENT ALTITUDES REQUIRE CHANGE IN FUZE SETTINGS. WHEN TWO OR MORE PICTURES ARE REQUIRED, BOMBS ARE DROPPED FIFTEEN SECONDS APART, WHICH PROVIDES A STRIP WITH FIFTY PERCENT AND MORE OVERLAP FOR STEREO INTERPRETATION.

However, the combat sorties that followed this decision were distinguished more by the expert flying of Lieutenant Colonels Frank L. Dunn, Leon W. Gray, and James F. Setchell, Majors Oscar Blomquist and Lloyd Nuttall, Captains John Hoover and Harry Jenkins, and others, than they were by actual reconnaissance results achieved.

But sufficient was accomplished to bring about the assignment of two B-25 aircraft which were suitably modified and equipped, and the training of special crews. A concentrated program of operational and technical experimentation was started in the fall of 1943 as the Photo Wing moved to Italy.

By January the main technical problems had been whipped, and in the ensuing three months, more than fifty combat sorties were flown.

From that experience, authority for this brief review has been taken.

The method of night photographic reconnaissance is not too different from normal night bombardment, except that bombs are magnesium flash bombs rather than high explosive and are fuzed to burst some 3,000 feet above terrain and illuminate the area desired on the photograph. The accompanying diagram (Figure 1) explains the basic method better than words.

The camera is actuated by a guarded photoelectric cell, which trips the shutter and automatic film-winding mechanism with each bomb burst. Bombs are fuzed at thirty-three seconds from release, which bursts them about 3,000 feet above the terrain. Dropped at fifteen-second intervals, a strip of pictures with fifty percent running overlap is obtained, providing stereo cover for detailed and accurate interpretation.

A "tandem" camera installation also was developed. Two cameras, installed perpendicular to the line of flight, took pictures simultaneously giving width of coverage with each exposure equal to more than three miles on the ground.

M-46 magnesium flash bombs with M-111 mechanical fuzes proved satisfactory. The drag plate was left on the fins to hold the bomb flight behind the aircraft and prevent fogging of the picture.

Several camera hook-ups were devised in-

FIGURE 2.

NIGHT PHOTOGRAPHY WITH FLASH BOMBS FROM 12,000 FEET. TARGET—PORTO SAN STEFANO, ITALY. GERMANS USED THESE SMALL HARBORS FOR NIGHT SUPPLY MOVEMENTS. NOTE SMALL VESSELS IN HARBOR, AND IN CANAL AT LOWER LEFT-HAND CORNER.

cluding both American and British equipment, the final and most effective being an assembly of K-19A twelve-inch camera and A-5 magazine.

The operational problems to be met, after crew practice and experimentation and the building of several camera installations had been completed, were more serious.

Here was one lone aircraft, a bomber in size, flying at medium altitude over heavily defended enemy positions. The bomb load of from twelve to twenty highly volatile magnesium bombs carried sudden cremation with a flak hit. Contrary to normal bombing, the night reconnaissance airplane had to remain on its bomb run for thirty-three seconds

after the bomb was released in order to obtain the picture of the area illuminated, thus restricting evasive action. Targets requiring three, four, or five bombs for complete illumination extended the bomb run in some cases up to two minutes—and 88's can throw a lot of "stuff" in that length of time.

The major problem, however, was—and is—navigation. Over blacked-out enemy territory, pinpoints are difficult to locate with precision without considerable "stooging" with its accompanying hazards for a lone plane.

Even a quarter moon is very helpful, and when targets are located near the coast, on a river, near a lake, or where short dead-reckoning can be done from a water checkpoint, great accuracy can be achieved. Water shows up well even on the blackest of nights.

On nights of good moonlight, highways, rail lines, and similar natural landmarks can be used accurately.

However, navigation is a definite limitation—albeit a limitation that is being overcome rapidly through use of various navigation aids. In the future it should be possible to do night navigation with pinpoint accuracy.

Under the flash-bomb system, there is a further limitation in the number of pictures that can be taken on a mission. The bomb bay of a B-25 will carry twelve bombs, and with the addition of wing racks an additional eight can be carried. However, this limits the mission to a total of twenty pictures—one for each bomb dropped.

All these problems were surmounted successfully and enthusiastically, because of a belief in the great potential value of night reconnaissance. The crew's constant dream was the disclosure of enemy movements at night, the finding of valuable shipping targets in small harbors for our medium and fighter-bombers, and the discovery of night reinforcements and defense construction.

In addition to these traffic searches, it was found possible to obtain urgently needed airdrome or bomb-damage coverage at night during periods of bad weather, for almost invariably the hours of darkness would bring clear weather up to medium altitudes and night reconnaissance planes could sweep in and get coverage denied their daylight sisters during periods of bad weather.

The actual use of night reconnaissance provides concrete evidence of its future value. For example, in April of 1944, just prior to the big push on the western Italian front, a total of seventeen night missions were flown covering the main supply routes feeding the Germans along the Cassino front. From information obtained from this coverage it was learned that German supply movements were normal, there were no apparent withdrawal indications, and operational plans were made accordingly. These seventeen missions provided valuable supplementary information to day reconnaissance, and earned special commendation from the Fifth Army.

Similarly, throughout the early months of 1944, a close night watch was kept on all small harbors along both the east and west coasts of Italy. The Twelfth Air Force and the Desert Air Force had done a good job "isolating the battlefield" so far as road and rail arteries were concerned, and the Germans were using small boats staging through these harbors to supply troops farther south. Such ports as Piombino, Porto San Stefano, Gaeta, and Leghorn on the west coast; Ancona, Pescara, and Rimini on the east coast; and Fiume, Split, Sibinik, and Makarska on the Balkan coast were covered periodically by night to check on barge and small-boat traffic.

From reports of these missions, medium and fighter bombers were able to select profitable targets for night and dawn anti-shipping raids. One official request from the Mediterranean Allied Tactical Air Force shows the growing value of night reconnaissance: "Recent night photography very helpful. Request following night photography be carried out earliest possible. San Stefano and Orbetello Canal three times nightly at approximate following times: one hour after dark, midnight, one hour before dawn. Porto Ferraio one hour after dark. Piombino one hour before dawn. Flash report and one set prints each objective this headquarters."

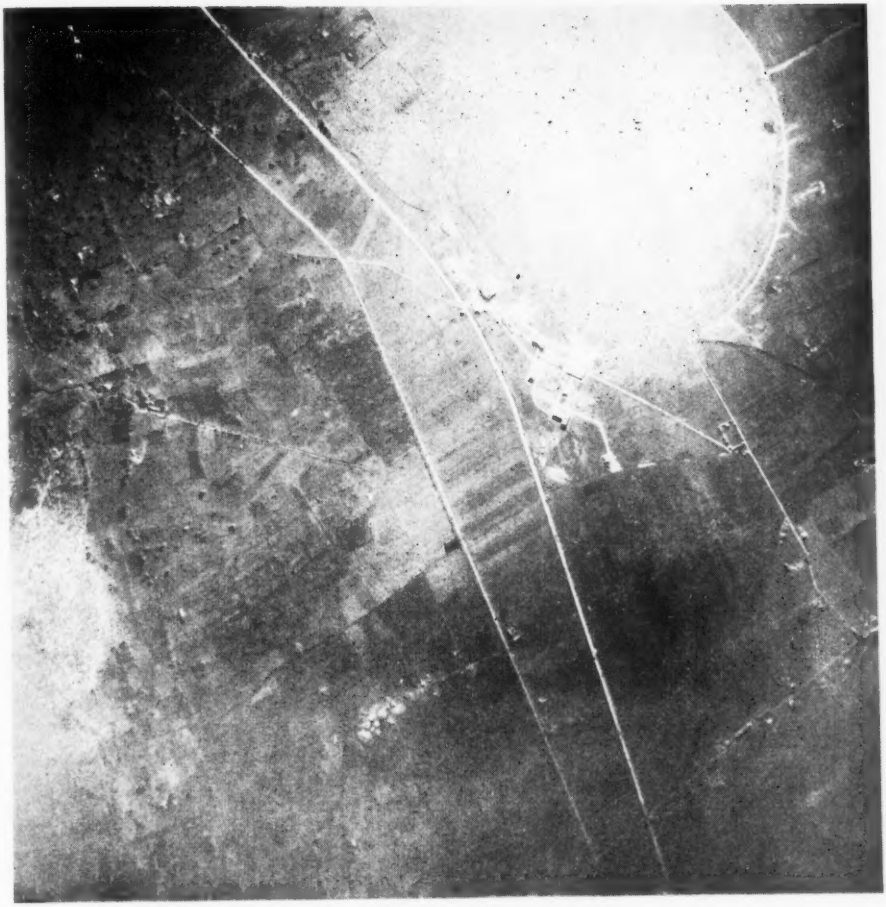

FIGURE 3.
KEEPING WATCH AT NIGHT ON MAIN SUPPLY ROADS. THIS PICTURE, TAKEN WITH FLASH BOMBS FROM 12,000 FEET, SHOWS RESULTS ALMOST AS CLEAR AS DAY RECONNAISSANCE. TARGET—MAIN SUPPLY ROADS LEADING SOUTH FROM AQUINO, ITALY. CIRCULAR AREA AT RIGHT WAS USED AS LANDING STRIP.

This flash bomb photography, from medium and high altitude, is one method of obtaining night reconnaissance. It will be improved—and has been improved—by the addition of accurate navigation equipment; faster and more maneuverable A-20's and Mosquitoes are replacing the faithful B-25; vulnerable flash bombs will be armored for increased safety; suitable tactics have been developed so that bombs can be released, evasive action taken, and the aircraft flown over the area to be photographed from a different approach coinciding with the burst of the bomb. Two aircraft might be used—one for bombs, the other for photographs. The possibilities are many and varied; the whole operation is still in its infancy despite the valuable work already accomplished.

Much experimental work is now going on, both in the United States and in combat theaters.

Another type of night photographic reconnaissance, also carried through its experimental combat stages by the Mediterranean Allied Photo Reconnaissance Wing, is an entirely different method originally developed by Doctor H. E. Edgerton of the Massachusetts Institute of Technology.

Doctor Edgerton is the inventor of the stroboscopic light used so successfully by photographer Djon Mili in his action photographs frequently seen in *Life* magazine.

Adapting this high-voltage, brilliant light of micro-second duration to aerial use, Doctor Edgerton built a large-scale version, in cooperation with technicians at Wright Field, then brought it to Italy for experimental and modification work.

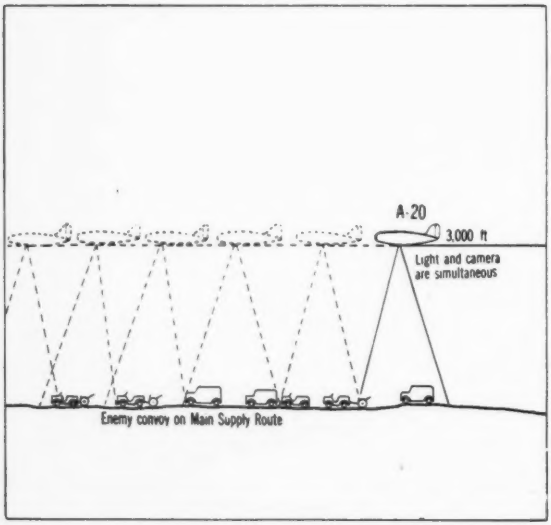

FIGURE 4.

SCHEMATIC DRAWING OF NIGHT PHOTOGRAPHY WITH "EDGERTON FLASH SYSTEM." ELECTRIC LIGHT FLASH AND CAMERA ARE SIMULTANEOUS EVERY FOUR-FIVE SECONDS DEPENDING ON ALTITUDE. FAST A-20 TYPE AIRCRAFT FLIES ALONG SUPPLY ROUTE BACK OF FRONT LINES OBTAINING CONTINUOUS OR INTERMITTENT STRIP OF ROAD AND TRAFFIC. INVENTOR, DR. H. E. EDGERTON OF MIT, ADAPTED EQUIPMENT FROM HIS STROBOSCOPIC LIGHT DESIGNED FOR ACTION PICTURES.

The pioneers at MAPRW attacked this new development with enthusiasm, for they were alert to night reconnaissance and saw in the principle of the Edgerton "flash" system a way to eliminate many of the hazards and limitations of "flash bomb" photography—if it could be made combat-operational.

The Edgerton system is based on the installation of a bank of condensers and flash units in the bomb bay, synchronized with a camera in the tail of the plane. The light takes its current from aircraft generators, with voltage built up through the condensers, then is flashed by the bombardier-navigator, or by a special observer or the pilot as pictures are required. The flashing of the light, either manually or by intervalometer, automatically takes the picture (see Figure 4).

The Edgerton system thus eliminates the carrying of highly vulnerable magnesium bombs, removes the limitation on number of pictures because a complete magazine or more of film can be exposed, and since the light and the photographic exposure are simultaneous, considerable evasive action may be taken between pictures through elimination of the necessity for straight and level flight while awaiting the bomb burst.

Unfortunately, the equipment (all that could be packed into a B-24) would not take interpretable pictures at operational altitudes of 15,000 feet and above for this type aircraft, so a complete new look at the needs and equipment had to be taken.

After various experiments, a reduced set of equipment was installed in a fast A-20 in the belief that low-level pictures of supply routes behind the line of contact could be made without prohibitive losses.

The first missions proved very successful.

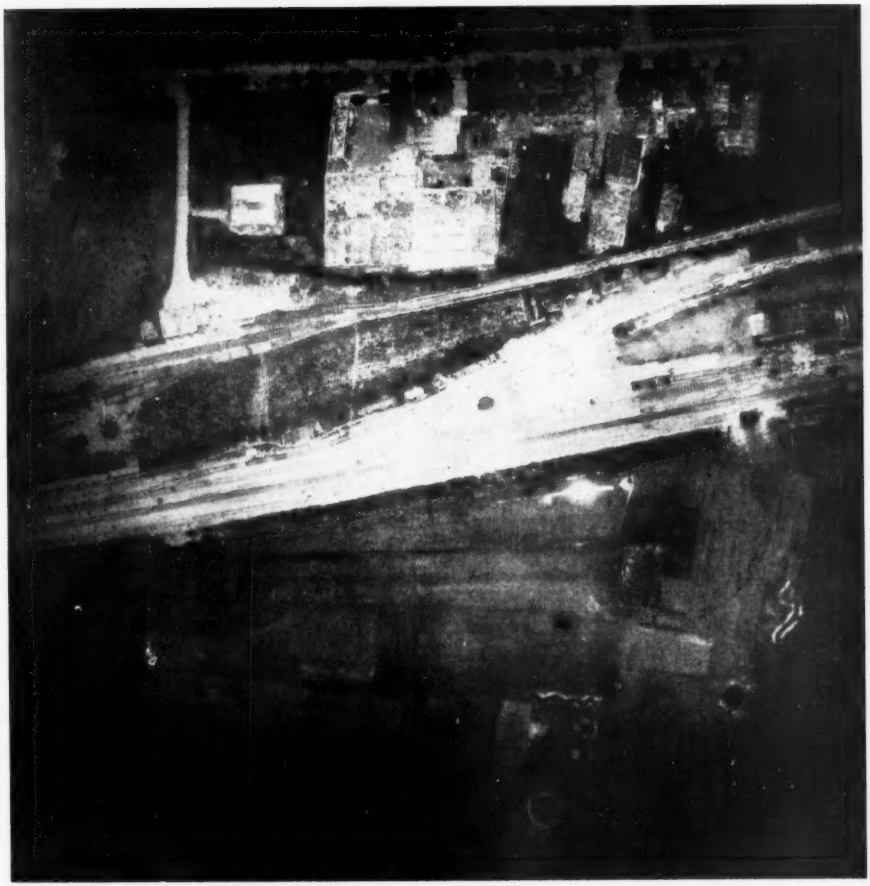

FIGURE 5.

EDGERTON SYSTEM OF NIGHT RECONNAISSANCE USES ELECTRIC POWER LIGHT, IS FLOWN OVER SUPPLY ROUTES AT LOW ALTITUDE—1,500 TO 3,000 FEET. SAMPLE ABOVE SHOWS COASTAL RAILROAD NORTH OF PESCARA, ITALY, FROM 3,000 FEET. NOTE BOMB DAMAGE TO TRACKS, BUT ONE THROUGH LINE HAS BEEN REPAIRED.

Flying at altitudes of from 1,500 to 3,000 feet, the equipment produced excellent pictures, showing up all details of road traffic.

From an operational standpoint, these low-level missions can be run on any supply system behind enemy lines where ground defenses have not been built up. This is particularly true in mobile warfare.

Here again, navigation is a problem, but several sorties were run nightly in both the Italian and German theaters and results were reported to be excellent.

On both types of night photography, equipment at present is limited but development is pointing in the right direction and in months to come adequate night reconnaissance will be available through higher echelons of all Air Forces.

There is no conclusive answer as yet to the question "What about night photography?" To answer that question one must keep in mind the limitations inherent in any flying and observations by night. But progress definitely is being made. Much vital information has already been obtained through night photography. The need for it exists. Improvements are being made and will continue to be made. It has its place, and an ever-growing one, among our intelligence sources. As time goes on, its importance and its value will increase hand-in-hand with improved techniques and procedures.

At the present time it is available to armies and air forces in the field, and has already done outstanding work in picking up enemy night movements, keeping watch on supply routes, finding profitable tactical targets, and penetrating at least a part of the enemy's cloak of darkness. It is believed by this writer that it will remain supplementary to day reconnaissance, but its value in that supplementary role can be, and will be, enormous.

Chinese Troops

Digested at the Command and General Staff School from an article by Captain D. L. Ducey in *The Coast Artillery Journal.*

OBVIOUSLY, anyone who has not associated with the Chinese will find them a different people from any he has known before. These differences lie not only in their language, customs, and food, but in their entire philosophy and way of thinking. Anyone who realizes this, and tries to appreciate and understand them, will find the Chinese are a thoughtful and dignified people, modest and self-effacing, quick to make friends, and unquestioned in their loyalty.

The Chinese is an efficient fighter and a good soldier when properly trained and equipped. This was proved in the North Burma campaign. They are not fanatics, but the Chinese Army will risk a greater number of casualties to accomplish their mission than the U. S. Army would care to risk. When they are ordered to take an objective or hold a defensive position, they will do the job regardless of their toll of casualties.

The reason for this lies in the fact that during the past seven years of fighting against Japan, the only thing that the Chinese had to fight with in sufficient quantities was manpower. They had inadequate equipment and for the most part equipment of inferior quality. What they lacked in effective equipment, however, they made up for in the viciousness of their attack; and human life was held cheap, as long as there were Japanese to knife, bayonet, and ambush.

When first we started training and equipping the Chinese, they were given more vehicles than the Chinese Army had ever had, and they did not have enough qualified drivers. Truck drivers had to be trained from men who in some cases had never driven a vehicle of any kind before. As might be expected, there were considerable difficulties on the roads for a while! The main difficulty we found was trying to teach them to drive at moderate speeds. After they had been driving for a few months, however, they turned out to be good drivers.

Normally, anyone confronted with learning the Chinese language usually throws up his hands in despair until he actually gets down to learning it, and then he finds out that it is not so difficult as he had imagined. I refer to speaking and understanding Chinese, and not reading and writing. It is a difficult task to learn to read and write Chinese, but if a person lives near the Chinese, he can soon learn to speak the language well enough to be understood.

Orphan of Army, Corps, and Division

MAJOR LEONARD R. KUIPER, *Chemical Warfare Service*
Instructor, Command and General Staff School

G-4's of all echelons must recognize the difficulties of supply of a chemical mortar battalion if it is to function most effectively. It has special supply problems which are not common to all theater units. Some departure from normal procedures is necessary to insure its adequate supply.

It is normal for this unit to be attached by army to corps and by corps to division. This procedure may vary but the end result—that is, attachment to a division—is usually the same. The term "attached to division" does not present the true picture, however.

A study of the employment of the mortar battalions now in the theaters of operations indicates that a more nearly correct statement would be that they are "attached to the ground." Their attachment to any particular division is incidental to that division's occupation of the ground upon which the mortar battalion is operating. Divisions come and go during the course of the operation, but usually the mortar battalions stay and are relieved from attachment to the outgoing division and attached to the incoming one effective on the date the new division takes over. This procedure may be gone through several times. In one case one of these battalions started an operation with a particular division, saw that division relieved for rest and refitting, was attached to two successive divisions in the same zone of action, and finally completed the cycle by attachment to the original division without ever coming out of the line. It is obvious that such short-term attachment, coupled with constant fighting, will introduce special supply problems. A variety of solutions has been tried to handle the various classes of supply under different circumstances. Classes I, III, and V supplies have been handled in a fairly satisfactory manner in most cases. Classes I and III are supplied by means of the daily telegram as is normal for all units, and they come in to the battalion without difficulty, in much the same manner as they are received by regiments within a unit. Here the distribution is not so much of a problem.

Class V begins to give some trouble. Theoretically, the Army Chemical Officer will establish chemical ammunition distributing points or depots and battalions will draw from them. This procedure will work in a number of cases and where feasible is being used in the theaters. However, in the case of several battalions spread over a wide front, it is sometimes impossible for the Army Chemical Officer to establish chemical ammunition supply points (ASP's) in sufficient number to supply all of these battalions adequately. The battalion ammunition section has a comparatively limited hauling capacity when you realize the tremendous tonnage of ammunition this unit may expend in a very short time. It must have chemical ammunition supply points available in close proximity to the center of the battalion's operational radius in order to effect supply adequately. A solution to this problem, which has worked very satisfactorily, is for the Army Chemical Officer to allot certain of his personnel to Ordnance ASP's and then have the Army Ordnance Officer stock the chemical mortar ammunition in the regular ASP serving the unit or units which the battalion is supporting. In any case, it is necessary, the greater part of the time, for the battalion ammunition section to establish a battalion ammunition distributing point forward of the ASP's. The mortar companies then draw their ammunition from this battalion distributing point, using their organic ammunition vehicles (see Figures 1 and 2).

Many different solutions to this ammunition supply problem have been worked out in the various theaters. They will be different for every situation, but the essential element is that cognizance of the difficulties must be taken by the ground commanders so that full cooperation between them and the mortar units will result in a workable ammunition supply plan.

The supply of Class II and IV supplies has not been satisfactorily worked out in most cases. The procedure laid down in basic War Department publications is being followed generally. It should be pointed out here that the breakdown is not at all the result of faulty principle but is due to the fact that in this one case the tactical employment is somewhat different from that originally considered to be normal. The short duration of attachments of the chemical mortar battalions is what is causing the breakdown for these classes of supply.

FIGURE 1.

QUARTER-TON TRUCK AND TRAILER CARRIES MORTAR, CART, EIGHT ROUNDS OF AMMUNITION, AND FOUR SQUAD MEMBERS.

The battalion supply officer compiles his list of shortages in Class II and IV supply and submits it through the regular channels; that is, to the unit to which his battalion is attached at the time. The requisition is properly accepted by the parent unit and processed through the normal channels. However, the time lag incurred in the supply of these articles is such that in a majority of cases the division is in a rest area or the battalion has been moved to another sector by the time the supplies arrive. Then the division must contact the battalion and request it to come and get its supplies. In a great many cases the tactical situation and distances involved make a further time lag during which the division must provide storage for these items and the battalion is suffering for a lack of these same supplies. If the division is in the line when it receives this equipment it is even more difficult to handle this storage until the supplies can be called for by the battalion supply officer. These requisitions may be submitted through corps, but that means going outside normal channels. In many cases the corps special staff officers will not approve this skipping of channels and leave the provision of these classes of supply up to the division to which the battalion is attached.

The shortage of some items in the European Theater necessitated the establishment of credits and allocations for various items of Class II and IV equipment. In this case the chemical mortar battalions are left almost completely out of the picture. Allocations are made to corps, divisions, and units on a similar level, but these separate battalions are generally not given an allocation because it is not felt necessary to establish these credits below group level. The greater part of the time the battalion is attached to a division, and the theory is that it can draw its allotment directly from the unit to which it is attached. This system, so far as the mortar battalions are concerned, works only in theory. Much of this equipment is issued as organizational equipment even though it appears in tables of equipment and tables of allowances as individual equipment. The units who receive these allotments are loath to issue such equipment to the attached battalions since there is no way of

telling how long they will stay with the unit. When they leave, it is a complete loss of the equipment to the parent unit or else it must be recalled for reissue within the unit. In view of the shortage and improbability of obtaining replacements, it is generally not deemed advisable to issue a pro rata share of the division or corps allotment to the mortar battalions. In lieu of that, a very limited amount is issued to designated key personnel and the rest of the battalion must get along as best it can. One particular case of this nature which I should like to cite as an illustration of this procedure is the combat suit which was issued for use during the winter months in the Italian campaign. Supply on this item was very short and one mortar battalion was required to draw its quota from the division to which it was attached at the time of issue. The allotment for this division was not sufficient to equip each individual in the division and attached troops. The division was screened and in so far as possible all the troops operating in the rear echelon and related activities who could provide themselves with some degree of protection from the elements were not issued this heavy clothing. The division, rightly enough, took care of the infantrymen in the front lines who had no means for providing themselves with protection other than clothing, but as a result the mortar battalion received only 100 suits for approximately 1,080 men. Upon relief from attachment to this division even those 100 suits were turned in, and since the allotments for units to which they were subsequently attached had been issued prior to their joining, they were out in the cold.

These chemical mortar battalions are not organized into groups so that a central control may be established. It is almost impossible for them to obtain the Class II and IV supplies necessary for them to function properly unless the higher headquarters allocating credits recognizes the nomadic existence of these units. The mortar battalions must receive specific allocations, even though it is the policy of these higher headquarters not to make allocations to units below group level.

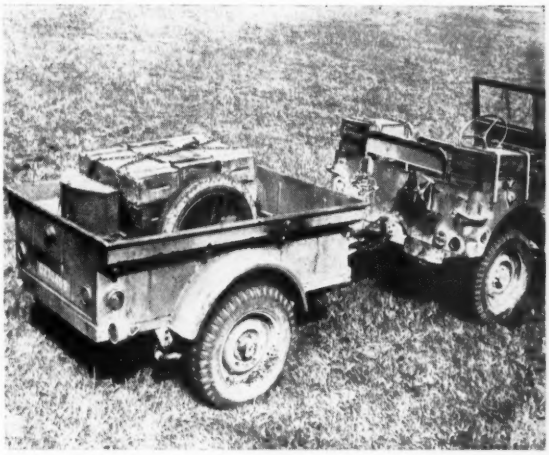

FIGURE 2.
QUARTER-TON TRUCK CARRIES TWELVE ROUNDS OF AMMUNITION ON CART IN TRAILER, EIGHT ROUNDS AND FOUR MEN IN TRUCK.

The chemical staff officers in the various echelons can and do help the battalions immeasurably in this situation, but it is done only through the force of their personality and not through any recognized channels. Without further authorization from the unit commander their status at present is only supervisory in nature. They do not have command functions over these battalions, so that any assistance they may render is through their cooperation with the other special staff members where supplies other than chemical warfare are concerned.

Rehearsal for the Rhine

An Account of the Ninth United States Army Operation "Grenade"

LIEUTENANT GENERAL W. H. SIMPSON
Commanding General, Ninth Army

THE Roer River rose to historical prominence in the winter of 1944-1945 when it became an integral part of the western German border defenses. It effectively closed the twenty-five mile gap in the Siegfried Line which our advance through Aachen had opened. For Ninth U.S. Army, a further invasion of Germany to reach the Rhine depended upon the forcing of the Roer River.

It was evident that this would be a major operation. The Roer covered the direct approach to the Ruhr industrial area (see Figure 1). Our advance to this river in November had been a slow fight against determined resistance and throughout the winter the Germans were extremely sensitive to any probing on the east bank. The situation called for the organization of a powerful attacking force before a crossing was undertaken.

There was another serious difficulty. The Germans were in possession of the Roer Dams, south of Duren, in front of First U.S. Army. These impounded sufficient water to flood the Roer Valley for two weeks, a serious threat if we reached the east bank while the dams were intact in their hands. One attempt to capture them had been unsuccessful, as had several efforts to destroy them from the air. Ninth Army faced the prospect of creating bridgeheads liable to be cut off by flood waters. Measures of security against this danger were planned; early massing of supply stockages on the far bank would help to make the bridgeheads as nearly self-sufficient as possible. Air supply drops were ready on call to support any isolated units.

Detailed plans for the Roer crossing were begun in early December, when we first reached the river. However, the operation was delayed for more than a month by the German counteroffensive, when the greater part of Ninth Army's troops were withdrawn to fight in the Ardennes. Further delay then occurred while Ninth Army waited for completion of preliminary operations by adjoining armies. First Canadian Army attacked in the Goch-Cleve area to secure positions for the main offensive (see Figure 2), while First U.S. Army, assisted by a division of Ninth Army, made a new attack to take the Roer Dams. The progress of the latter operation caused the Germans, on 9 February, to wreck the discharge valves and release the water behind the Schwammanuel Dam. The resulting flood made it necessary again to postpone Ninth Army's attack.

We used the time during these enforced delays to perfect plans, training, and build-up for the Roer crossing.

Since the river itself was the crux of our problem, an engineer group was assigned to support each assault division, and combined infantry-engineer training was given particular attention. River-crossing schools were established on the Maas and Inde Rivers, where infantry units, withdrawn in rotation from the line, trained directly with their supporting engineers. Infantry-engineer teams rehearsed the assault crossings on terrain resembling that of the Roer.

Large stocks of supplies had to be accumulated. Requirements were calculated on the assumption that heavy losses by accident and enemy action would be sustained during the early phase of the operation. Up to 100 percent replacement was provided, especially in engineer equipage. By placing severe restrictions on ammunition expenditure during the static period, an adequate reserve was gradually built up.

The heavy concentration of troops and supplies taxed the poor road net west of the Roer. The few paved roads began to disintegrate under the heavy traffic, especially after the early thaw at the beginning of February. The most intensive maintenance could not be a complete solution to this problem. To reduce the strain which would be placed on transportation after the start of the attack, all possible forward dis-

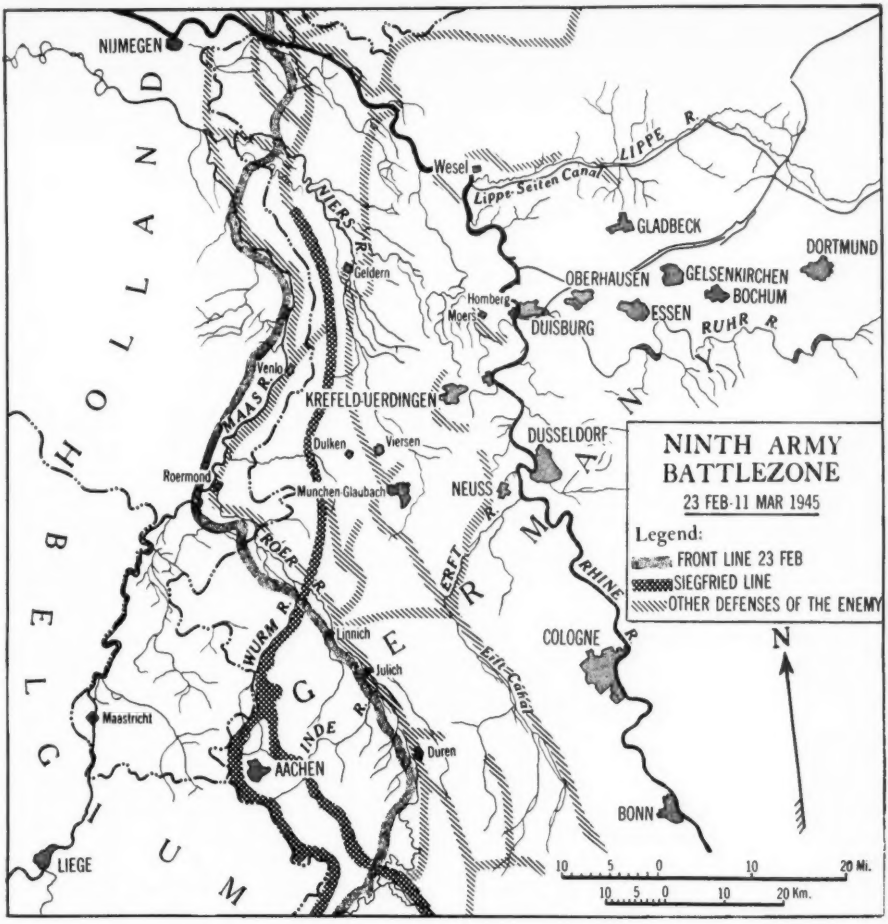

FIGURE 1.

placement of supplies was accomplished during the waiting period. Seven days maintenance for the assault divisions was spotted close to the river. This forward reserve, originally intended for quick movement to the far bank with a view to making the bridgeheads self-sufficient, in the actual operation was of great value in sustaining the rapid advance.

In spite of the length of the preparatory period we succeeded in concealing our concentration well enough to obtain tactical surprise. All security measures were strictly maintained, including evacuation or close surveillance of civilians in the vicinity of training areas, restriction of troops to assembly areas, concealment of identity of new units, radio restrictions, and the like. Troops were concentrated in rear areas and moved forward at the last minute. Preservation of the secrecy of our crossing sites was rendered difficult by the excellent observation which

the enemy had of the flat, open ground west of the river. Most of the movement of supplies and equipment to forward points, and work on approach roads, had to be done at night. These elaborate precautions were well repaid. Although the enemy became aware by the middle of February that an attack on the Aachen front was impending, he still did not know its strength, location, or direction.

The front line at this time was the river itself on our right and center, from the army's south boundary to a point north of Linnich. On our left the enemy still held the west bank, and XVI Corps' front angled back some distance from the stream, to make contact with the British west of Roermond. Here the Siegfried Line lay east of the Roer. Beyond the Roer were well-prepared defenses ranging in depth back to the Rhine. The first of these was a double line of trenches running south through Erkelenz to Linnich, thence east to the Erft Canal. The latter part of this line commanded the vital Linnich-Harff plateau. Some five miles farther back was a second defense line, covering approaches to Munchen-Gladbach, which included multiple fire trenches, belts of mines and wire, and numerous heavily defended villages. Both these lines, as well as other separate fortified areas, faced generally west and southwest, but were more vulnerable on the east. An advance coming from the south would have the advantage of outflanking most of these defenses.

The terrain in our zone favored movement in a south to north direction with the area sloping northward. An east-west plateau, lying generally between Linnich and Harff, was the key terrain feature in our entire zone of action. Objectives were the major cities on the Cologne plain: Erkelenz, Neuss, Munchen-Gladbach, Krefeld, Kempen, and the two towns of Viersen-Dulken. Considering our mission and the area of our operation, of all these objectives, the large industrial city of Munchen-Gladbach was so located that its reduction was paramount. It sat squarely in the middle of our zone like a well-placed pillbox.

Since the mission of the Ninth Army was to attack northeast in conjunction with the Second British and First Canadian Armies to clear the enemy from the area between the Rhine and the Maas Rivers, the first move after the Roer had been successfully breached was to seize the Linnich-Harff plateau and break the enemy's southern defenses. The First U.S. Army was to operate with one strong corps on our right as far east as the Erft River which would give us the necessary flank protection. Once this vital terrain feature was in our hands, the immediate objective of our attack was Munchen-Gladbach. I had several alternate choices in reducing this strongly fortified city. Terrain favored envelopment from the east along well-defined terrain corridor from the Linnish-Harff plateau northeast to Neuss. Enemy defenses were weaker here. However, it would necessitate the use of a division to block off the eastern flank, and maneuver room was limited. Supply also would be harder to effect. An attack from the west would be through heavily wooded areas, more towns, and villages, against strongly prepared defenses. A frontal attack would require a great degree of power to drive through a heavily populated area that was echeloned in depth against us. A double envelopment permitted greater maneuver room and more flexibility, but had the disadvantages of both the single envelopment plans with the increased difficulty of more widely separated supply lines.

Much depended on the nature of the opposition the enemy put up and, although he appeared to be holding the line of the Roer River lightly, we knew he had considerable reserves which might offer stubborn resistance to our advance.

Therefore, I issued instructions based upon alternative plans:

1. In case of heavy resistance, after the initial bridgeheads were secured, XIII Corps would advance northwest parallel to the river, to outflank the Siegfried defenses and create a bridgehead for XVI Corps. Then

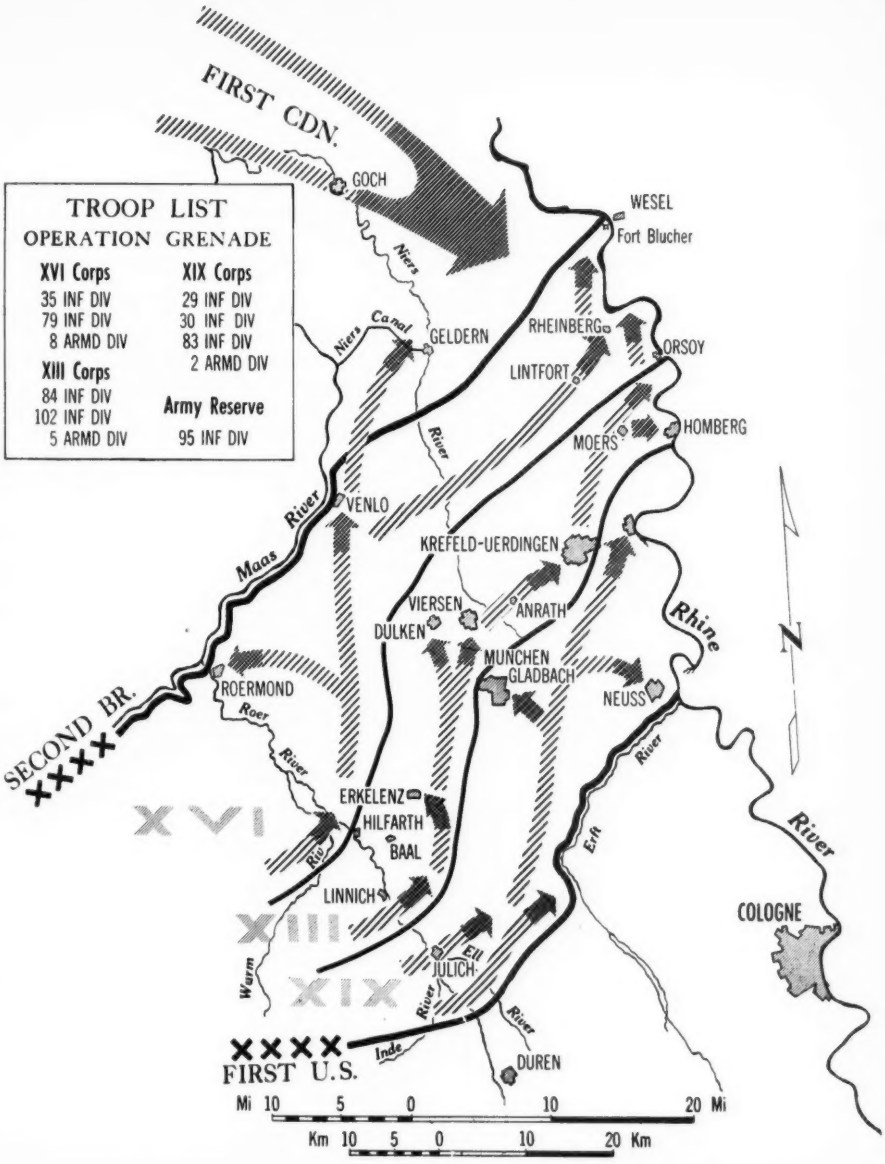
TROOP LIST
OPERATION GRENADE
XVI Corps
35 INF DIV
79 INF DIV
8 ARMD DIV
XIII Corps
84 INF DIV
102 INF DIV
5 ARMD DIV
XIX Corps
29 INF DIV
30 INF DIV
83 INF DIV
2 ARMD DIV
Army Reserve
95 INF DIV
FIRST CDN.
GOCH
WESEL
Fort Blucher
Niers
Niers Canal
GELDERN
RHEINBERG
ORSOY
LINTFORT
MOERS
HOMBERG
River
VENLO
Maas
KREFELD-UERDINGEN
VIERSEN
ANRATH
DULKEN
Rhine
MUNCHEN GLADBACH
NEUSS
ROERMOND
Roer
SECOND BR.
XXXX
ERKELENZ
HILFARTH
BAAL
XVI
LINNICH
XIII
Erft
COLOGNE
JULICH
Warm
XIX
Inde
DUREN
FIRST U.S.
Mi 10 5 0 10 20 Mi
Km 10 5 0 10 20 Km

FIGURE 2.

the three corps would attack abreast to the Rhine.

2. In case our crossing caught the enemy off balance, XIII Corps was to strike out at once behind the Siegfried Line, seize Erkelenz, drive rapidly north past the built-up area of Munchen-Gladbach, then turn northeast to reach the Rhine opposite Duisburg. XIX Corps, after advancing eastward to the Erft Canal, would wheel to the north, take Munchen-Gladbach from the east, and seize the near bank of the Rhine from Neuss to Uerdingen. XVI Corps would cross the Roer behind XIII Corps, take the Siegfried fortifications from the rear, clear the east bank of the Roer and Maas to Venlo, then swing east on the army's north flank to meet the Canadians. There was the further possibility that a rapid pursuit might enable us to capture an intact bridge over the Rhine.

Preparations for the attack had been brought to a state of readiness just at the time the enemy opened the dams. We could only maintain our position, and add some improvements to our preparations, while we waited for the flood to subside. The river overflowed its banks along the entire Ninth Army front. The water level rose five feet two inches in two days, the width increased to as much as 2,000 yards and the velocity to six or seven miles per hour. The persistence of high water was aggravated by the unseasonable thaw which had begun on 31 January, and the Roer remained impassable for two weeks.

I wished to attack at the earliest practicable date, believing that any additional trouble which we might have with the river would be compensated if we succeeded in crossing before the enemy though it possible. On 21 February the Army Engineer advised that, though the river would still be swollen, we would be able to negotiate it on 23 February. Acting on this prospectus, I issued orders for the attack on the morning of 23 February, preceded by a forty-five minute artillery preparation.

The terrain along the Roer was unfavorable for crossing anywhere in the army zone. The river flows through a wide swampy flat, with many parallel channels and drainage canals. Condition of the banks and approaches was especially bad after the inundation. Crossing sites were selected on the basis of the limited advantages available.

The only feasible crossing point in the XIII Corps sector was at Linnich. The sectors north and south of the town were ruled out because of the wide valley cut up by numerous channels and ditches, the unfavorable banks and poor approaches. Linnich furnished the best cover to be found on the west bank, and was served by a paved road on both sides of the river. Undesirable as it was to cross two divisions on a two-mile front at such an obvious point, that was the best solution available.

In the XIX Corps, similar considerations dictated crossing one division at Julich, although at this place there was no cover on the west bank and the enemy held a commanding position in the town and citadel on the east side. South of Julich, crossing was prevented by the confluence of the Inde River with the Roer. The only remaining spot was the vicinity of the minor road Pier—Krauthausen (see Figure 3), just north of the army boundary. This was in many respects an illogical site, requiring several secondary bridges on the approaches and exits. But for lack of any better place, it was to be used by the other assault division.

All sites were unfavorable for daylight crossing. The west bank offered little cover. The enemy had a well-organized position, and the higher ground east of the river gave him excellent observation and fields of fire over approaches from the west. Hence, despite the trouble to be expected in negotiating during darkness the boggy ground, wire, and mine fields on the far bank, H-hour was set for 0330, 23 February.

The actual crossing encountered all the expected difficulties, but no major ones which had not been foreseen and provided for. For that reason, our assault was suc-

cessful, and the entire operation progressed rapidly and as planned.

The assault was preceded by a forty-five minute artillery preparation, reinforced by infantry, cannon, mortars, antiaircraft guns, and tank destroyers. Enemy defenses were smoothered. The first assault waves received little hostile fire, and found the enemy along the river bank in a state approaching collapse. This, added to the surprise which he had achieved in time and location of crossing, enabled all assault battalions to push forward rapidly to their initial objectives.

One of the principal effects of the artillery preparation was to disorganize completely the enemy's communications on the far shore. It is noteworthy that the enemy never was able to reinstitute these communications effectively, due to the rapidity of the advance which, in turn, gained its initial acceleration from this condition.

Later waves came under considerable small-arms and mortar fire, which caused the loss of many boats. Others were carried away or damaged by the swift current. Of sixty assault boats put into service at Roerdorf, only two were still usable when ferrying ceased. Personnel losses on the river, however, were comparatively low. The lifesaving precautions which had been instituted, including lifebelts, lifeguards, and rescue boats, were completely justified.

LVT's were employed with good results. They proved capable of negotiating the soft banks, but six of them were

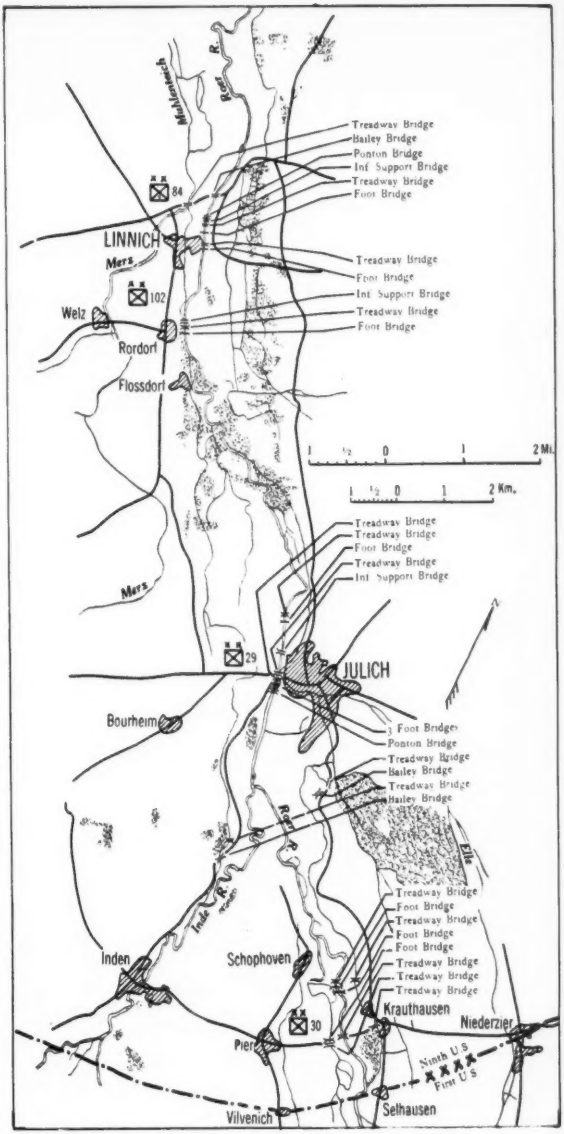

FIGURE 8.

NINTH U.S. ARMY—BRIDGING THE ROER 23 FEBRUARY—10 MARCH 1945.

knocked out by mines on the near bank. The greatest source of difficulty with these vehicles was inexperienced operators. Drivers need considerable training, especially in the technique of getting in and out of the water, and in operating during darkness.

Bridge construction began very early. Several footbridges were started during the artillery preparation, others at H-hour. Two vehicular bridges were under construction by H plus 2, and three others were begun during the morning. In consequence, troops and equipment were able to cross as rapidly as they could be accommodated on the bridgehead.

Smoke was employed in several places to conceal bridging work, as well as to screen some of the assault crossings. Some difficulty resulted. The smoke hampered construction and interfered with artillery and air by obscuring targets. Division control of smoke proved inadequate. In an operation of this type it is advisable for corps to coordinate plans for smoke, and in event of unexpected interference to make the decision whether to continue the screen.

A few enemy planes succeeded in attacking our bridges. They destroyed the treadway bridge below Linnich, and for a time the only vehicular bridge in XIII Corps was the one at Roerdorf. This enemy success may be attributed to lack of antiaircraft artillery on the far side. The incident demonstrated the importance of a high crossing priority for antiaircraft weapons.

Enemy artillery registered on some of our bridges so accurately as to knock them out repeatedly. Two eventually had to be moved to less favorable sites. Others, because of enemy fire as well as action of the current, were rebuilt several times.

In addition to the effects of enemy fire, a great deal of bridge equipment was lost due to breaking of cables, and to drifting boats crashing into bridges. These losses, directly due to the strength of the current, were not unexpected, being the price of the surprise achieved by crossing before the flood had fully receded.

This heavy drain on engineer material could have resulted in delay which might have compromised the entire operation, had we not had ample reserves of equipment immediately available. The 100 percent replacement of boats and bridging material in engineer parks close to the river provided the means for maintaining uninterrupted progress of the assaut. This I consider one of the essential factors in our success.

The same principle applied to ordnance proved valuable throughout the operation. Battle losses were regularly made good in one or two days from well-stocked replacement pools following close behind the front.

Before the end of the first day the Roer bridgeheads were an accomplished fact, with four divisions across. It had been a passage complicated by many difficulties, which we had in a sense deliberately multiplied by attacking while the river was still swollen. The surprise thus gained and the rapidity of our development upset the defense so completely that the river crossing became a breakthrough.

The first day's attack overran the light covering force which the enemy had in position along the river, and the advance pressed several miles inland. By 25 February, Ninth Army had made junction with First Army, to create a solid bridgehead twenty-five miles long, from north of Baal to south of Duren. Although five divisions of the German Fifteenth Army were in Ninth Army's sector, they were unable to move into position in time to block our advance, and succeeded in mounting only local and ineffective counterattacks.

On 25 February, it being clear that there was no firm resistance in front of us, I ordered the breakthrough plan put into effect. This plan was initiated and carried through with complete success.

XIII Corps committed its armor in a northward drive to cut off Erkelenz, hub of the dense road network and astride the key double-track railroad, from the rear. This attack intercepted a German division in process of moving to the defense of the town.

The enemy units, committed piecemeal, could not interfere seriously with our advance, and infantry took Erkelenz the same day (26 February). Capture of this town made two enemy lines untenable, the Siegfried fortifications in front of XVI Corps and the line running eastward from Linnich, and at the same time opened up the roads to the north. XIII Corps pushed on rapidly through disjointed resistance, passing west and north of Munchen-Gladbach, to reach Krefeld and the Rhine (3 March).

XIX Corps continued eastward to the Erft Canal, overrunning elements of 9th Panzer Division, which was attempting to get into action. With its flank on the canal, XIX Corps then wheeled north (28 February) and drove with its armor to the Rhine near Uerdingen, bypassing Munchen-Gladbach on the east. Following the armor, infantry took Munchen-Gladbach in one day (1 March) by outflanking resistance from the south and east, and cleared the west bank of the Rhine to the army boundary at Neuss (3 March).

XVI Corps crossed the Roer, reduced the Siegfried Line, and cleared the entire western half of the army zone to Venlo and Geldern, where contact was established with the Canadians (3 March).

The whole advance after 25 February had been very rapid, completely disorganizing the defense. This was the fruit of our flanking maneuvers, which turned the enemy out of strongly prepared positions and forced his hasty withdrawal. Besides the army maneuver as a whole, the operation was rich in examples of flanking tactics on a smaller scale. An outstanding example was Munchen-Gladbach, which was bypassed by the armored spearhead and then mopped up by independent infantry action. At Krefeld, on the other hand, frontal attacks were made by leading echelons of two corps, with the result that they became embroiled in fighting which slowed the entire advance.

The tactics of armored thrusts followed by infantry divisions to mop up and capture bypassed strongpoints worked to perfection in this breakthrough. Motorized task forces organized by infantry divisions proved valuable for maintaining close cooperation between infantry and armor.

On 3 March there remained to the Germans two routes of escape across the Rhine, one opposite Wesel and the other in the Orsoy-Rheinberg area. The latter line of retreat was closed when XIII Corps, again using flanking tactics, took Moers and cut between Orsoy and Rheinberg to the river (5 March), while XVI Corps seized Rheinberg (6 March). Unfortunately, the Wesel bridge, sheltered in a bend of the Rhine and on the boundary between Ninth U.S. and First Canadian armies, could not be outflanked. The Germans succeeded in holding a bridgehead there for another four days, giving them time to withdraw their troops and destroy the bridges. The hardest fighting of the operation was produced by the frontal attacks on the Wesel pocket.

The last resistance on the west bank of the Rhine in Ninth Army's sector was cleared 11 March, and the army was in position for the final spring into the heart of Germany. Two weeks later we assaulted the Rhine. In this operation we were able to re-employ most of the equipment and detailed plans and procedures which had been so successful on the Roer. If the crossing of the larger river seemed in the event easier than the forcing of the smaller, it was in great part due to the fact that the basic job on the first occasion had been well done.

Aside from the positive success attained, one of the most gratifying aspects of the operation lies in the fact that it again proved the soundness of certain time-honored tactical principles. For example, the entire operation was based upon maximum use of maneuver, employing mass and movement over most suitable terrain with alternate plans prepared for exploitation as indicated by the situation. The sudden swing to the north following the establishment of the initial bridgehead turned the enemy out of his strongly prepared positions and forced his withdrawal. Maneuver subsequently was employed to advantage in the swift envelopment and reduction of hostile strongpoints by subordinate units.

Likewise, continuity of the advance was insured, before the start of the operation, through the initial grouping of assault units and reserves. In each corps, infantry crossed the river, established bridgeheads, and sealed off sensitive flanks; the armor followed immediately in rear, prepared to exploit the ensuing breakthrough; additional infantry was echeloned in rear of the armor to reduce isolated strongpoints, mop up bypassed units, and protect the flanks and rear of the advance. It was most gratifying to me to watch this preconceived build-up take shape as the operation progressed, following the plan except for minor deviations dictated by the immediate situation. Throughout the operation, both army and corps were provided with ample reserves to exploit any advantage and it is significant that throughout the operation one entire division, rotated at intervals, always was in army reserve.

Extremely gratifying to me, also, is the fact that the operation was accomplished with minimum losses of personnel and equipment. Again, this was due in large measure to the skilful use of maneuver tactics and to frequent rotation among units in assault and holding roles, thus, in effect, providing fresh and ready reserves at all times.

Another maxim of the military art which again was proven in this operation was the importance of plans and preparation. A tremendous amount of time and effort was put into the development and perfection of plans at all levels of command. I feel that this time and effort expended by the respective staffs was richly rewarded by the results attained.

The operation was assigned the code name "GRENADE." Perhaps there is a certain significance in this name, in that the operation figuratively exploded in the enemy's face with the shattering force of a grenade, constituting the signal for the last great drive that continued, with only a brief interlude preparatory to crossing the Rhine, to contact with the Russians on the banks of the Elbe.

"Underground" Ferry Service to Norway

From a British source.

THE reason why some 200,000 German troops were prevented from leaving Norway to take part in the early stages of the Battle of Berlin originated a short time after the German occupation of that country.

In those black early days a ferry service was started which, until VE-day, ran regularly between a secret base at Skaloway, on the west coast of the Shetland Islands, and Norway. Secret agents and radio operators, arms, explosives, ammunition, and equipment were regularly shipped over to the Norwegian underground, and Norwegian volunteers were brought back.

At the beginning, in 1941, the ferry service consisted of half a dozen fishing smacks, each manned by a crew of four fishermen. During the first season half of them were sunk, but they were immediately replaced by nine others.

Soon the scattered resistance groups in Norway were coordinated into a secret army directed from Britain. But the fishing smacks proved to be too slow and too vulnerable to carry on the important and dangerous task of supplying them, so they were replaced by a flotilla of American sub-chasers armed with Bofors, Oerlikons, and six-pounder guns and fitted with radar, flying the Norwegian naval ensign and manned by Norwegian fishermen in naval uniform.

In addition to their routine duties, the now redoubtable ferry service worked in coordination with the Royal Navy and the RAF in attacking German coastal shipping. These attacks, combined with the attack on Nazi land communications by the Norwegian underground army that the ferry service had equipped, completely upset German plans to leave Norway.

Jungle Operations

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Instructor, Command and General Staff School

THOUGH the author served in the Pacific for twenty-six months, this article is not based on his experience alone nor is it confined to any specific operation. The information has been compiled from experience, interviews with many officers who have fought in jungle campaigns, and from combat reports from Allied troops, from all jungle theaters. It is not intended as an inclusive coverage of jungle operations but rather as a portrayal of some of the common problems that a staff will have to solve before and during a jungle operation.

The jungle is the dense tropical growth that includes the undergrowth, trees, vines, giant ferns, swamps, mosses, and flora found from the beaches to the timber lines of the rugged volcanic mountains. The term jungle will carry this meaning wherever used in this presentation. It will be readily noted that this excludes open shore and plantation areas. Let us consider, then, the effect that this jungle has on troops.

1. PHYSICAL.—New troops arriving in the jungle experience a climate to which they are not accustomed and which demands unusual physical stamina to withstand the hardships that it imposes upon them. It saps strength and enegry, evaporates body fluids, all tending to produce excessive fatigue. This constant excessive fatigue leads to the second effect.

2. DISEASE.—Lowered resistance enables jungle diseases, with which troops are not familiar, to strike. Here in adverse climate under primitive conditions of the jungle, armies have been defeated and campaigns lost as a result of disease.

3. PSYCHOLOGICAL.—In the jungle where physical hardships are excessive, psychological reactions affect the troops. The dull gloom of the jungle, the drifting mists, the limited visibility, the grotesque shadows, strange noises that make men jumpy and panicky tend to increase the morose eeriness that only adds to the feeling of insecurity.

4. MORALE.—The constant, prolonged physical hardships of jungle operations, the constant threat of disease, and the psychological effect of the jungle all tend to lower the morale of troops.

Some major problems that the jungle imposes upon operations could be listed as follows:

1. OBSERVATION.—The jungle restricts all observation and frequently limits it to a few feet. This makes contact and control most difficult. This loss of control must then be offset by narrower frontages, reduced distances and intervals between individuals and units, increased patrol activity, and increased responsibility of the small unit leaders. This lack of observation increases opportunities for ambush and surprise by small-arms fire by enemy units.

2. COMMUNICATION.—Communication personnel have to work long hours under most difficult conditions. All organic means of communications are used, but the efficiency is reduced as much as seventy percent in the case of radio. Telephone and messenger are the basic means of communication. The decreased distance between units makes the use of sound power telephones most desirable. Their reliability, light weight, ease of handling are all desirable for jungle operations. Since batteries have a much shorter life in the jungle it is necessary to have at least twice the usual supply that would be needed in temperate zones. This increase requires additional personnel to carry the extra supplies and equipment. The moisture and fungus of the jungle is an enemy of signal equipment, and to give it the protection that is necessary to enable it to last under these conditions it must be moistureproofed and fungusproofed. An untreated phone left in good working condition at dusk may be completely covered with grayish, blue, or greenish mold the next morning or may be completely dead. Patrols and outposts use prearranged improvised signals that they have

made up and rehearsed beforehand. Such forms are low whistles, tapping on rifle stock, tapping two sticks together, imitation of jungle bird calls, and such forms that will not give away their locations or presence in enemy locality. Messengers are the primary means of communication in companies, platoons, and in battalions on the move and in the attack. That means that all messengers must be reliable, courageous, intelligent, possess initiative and physical stamina. They must be carefully selected in sufficient numbers to replace casualties if the primary means of communication is to continue to function efficiently in the smaller units.

3. TRANSPORTATION.—Hand-carry is the principal means of transportation. This task is performed by natives where available or by designated troops that are organized for the purpose. On occasions, pack animals have been used, but they in turn create a problem of care and supply of their own food. In most tropics, vehicles can be used in coastal regions around towns or plantations where roads have been constructed and are available for vehicular use. Even these, with military traffic and tropical rains, soon become an oozing mud pit with an unlimited capacity to mire wheeled vehicles so completely that they cannot move. This makes it very difficult to use wheeled vehicles until the engineers can improve trails or construct passable roads for vehicular traffic. Tracked vehicles have proved to be far more satisfactory in jungle operations since they can move off roads across country or through considerable mud without getting stuck. However, they too are limited to coastal regions, plantations, or cleared areas until roads have been cleared in jungles.

4. CAMOUFLAGE.—The jungle provides ideal concealment for military operations. The dense growth, dim light, and spongy surface make silent movements possible and increase the hazard of surprise. For these same reasons it is most difficult to determine the exact location of the enemy defense positions and installations. On many occasions, soldiers have walked over Japanese installations not knowing they were there.

5. TACTICAL INFLUENCES.—(*a*) *Movement*—In jungle operations movement is calculated in terms of time rather than in miles. The major problem is not how far but how long will it take to make the move? Since movement is by foot, the terrain difficult, and the jungle impedes progress, any troop movement is slow. It is not uncommon to spend two hours of hard travel in traversing a distance of half a mile through the jungles where trails are not available.

(*b*) *Support.*—The supporting arms and services have great difficulty in moving over jungle trails. The difficulty of movement and weight of weapons, equipment, and supplies decreases the speed of the arms and services, thereby forcing the ground troops to reduce their speed to the speed with which these units can move.

(*c*) *Flank Security.*—The thick jungle and absence of trails makes it difficult for flank security units to maintain a uniform rate of march. The noise of movement through undergrowth and of cutting trails may warn the enemy of their approach. The constant change of security detachments that have to move to the front and flanks and rejoin the tail of the column as it passes greatly reduces the speed with which a column can move even on a trail in the jungle.

(*d*) *Supply.*—The supply of ammunition, food, and equipment that can be maintained for the troops will regulate the advance of combat forces. The primary means of supply is by hand-carry. Where organic troops have to be used for carrying parties, the length of the carry should be seven miles or under. Once it reaches beyond seven miles the carrying parties can carry little more than enough for their own maintenance. While this is true with troops, natives can be used efficiently over greater carrying distances since they carry larger loads with greater speed and return to a base camp for their own rations. The rapid deterioration of clothes and shoes only adds to this supply problem that has to be solved.

(*e*) *Fields of Fire.*—In jungles, good fields of fire are rare and ideal firing positions are seldom if ever found. The limited

visibility and broken terrain are definite limitations upon fields of fire. These plus jungle growth limit fields of fire to distances of fifty yards or less for automatic weapons and even considerably less for individual riflemen.

Let us consider next some training problems.

A new division arriving in the jungles to undergo a period of training to develop physical stamina and to acclimate the troops has to start training in early morning hours or late afternoon while it is cool. This means starting with about two hours in early morning and two hours in late afternoon and working up gradually each day until after a week the troops can do a normal day's duty. Tactical marches and exercises should be conducted over the most difficult terrain to condition men and familiarize them with the jungles.

At the same time, psychological training should be conducted. Common sense talks are helpful, but experience alone can overcome these effects. Training in jungles, using live ammunition, high explosives, overhead fire, patrolling, conducting tactical exercises, using combat firing ranges, and living in jungles all aid in familiarizing the troops with battlefield conditions in the jungle in which they will operate. They must develop suspicion to the extent of constantly searching for a hidden enemy, and patience to the extent that they can move with stealth.

The medical section should instruct troops in jungle sanitation, health, and hygiene. They will be subjected to new diseases, infections, and pests that are strange to them and of which they know little or nothing. This must be met by medical training that will enable them to maintain health even under rigors of jungle combat. Jungle diseases and infections are easier to prevent than cure.

The common-sense instruction, explanation of jungle difficulties, living and training in jungles that familiarizes troops with future combat terrains, noises, hardships, and the necessary medical instruction all help to build confidence and put troops in the right frame of mind for combat, thereby helping to maintain a high state of morale.

Operational training is conducted as a part of an over-all integrated training program. The lack of adequate observation must be offset by increased patrolling. Control difficulties demand more thoroughly trained leaders and individuals.

In jungles, communications are most difficult to maintain. Messengers must be selected and trained in sufficient numbers to replace casualties and losses from exhaustion. They must be skilled scouts, good shots, alert, and observant to survive. These abilities should be developed in training.

The hardships of jungle operations demand the highest development of leadership. Control difficulties necessitate decentralization which increases the importance of small unit action. This makes it necessary to have NCO's and officers with daring initiative, outstanding boldness, and lasting determination. The development of these officers and NCO's and the development of self-reliance on the part of every individual soldier should be a major training objective.

Lack of road systems prohibits the use of adequate vehicular transportation in jungle operations. This means that transportation is a major problem in all jungle operations. This problem should be partially solved in training. The organic vehicles should be decreased in number and used in areas corresponding to shore line or plantation areas during the training exercises. From this point, other means of transportation for supplies and equipment should be developed. Trucks are used to move supplies forward as far as possible and from there they are taken by carrying parties and moved inland to the combat troops in maneuver and combat training. This necessitates organization of hand-carry parties in the division, thereby necessitating shifting of personnel of all units that can be spared for this purpose. Combat or infantry troops are used only when other troops cannot adequately provision the combat units. When such cases occur it has been necessary to use battalions of infantry as car-

rying parties. The training program should be inclusive enough to train battalions in carrying supplies, equipment, ammunition, guns that are broken down into carry loads, and evacuation of the wounded. The training should provide for facilities for carrying, instruction in packing and balancing the load, and column protection against the enemy ambushes.

The usable transportation will limit the weapons that can be taken and the amount of ammunition that can be carried. This requires a reduction in supporting weapons and forces the commander to use a tactical plan based mainly on the use of weapons that the troops carry, which do not use too much or too heavy ammunition. Training brings out these factors and experience has shown that the short-range arms that are easily supplied with ammunition and readily transported over difficult terrain are best suited for use in jungle warfare. These are: rifle, BAR, carbine, pistol, TSMG (Thompson submachine gun), grenades, and machete.

Less maneuverable arms are the mortars, machine guns, rocket launchers, and flame throwers. These may be hand carried but are difficult to supply with ammunition in jungles, yet may be necessary in attacking fortified positions.

Heavier supporting arms can be used where jungle savannas allow them to be brought into range or where the engineers can build necessary roads to allow them to move into firing areas.

Training will also bring out the fact that weapons require constant preventive maintenance to keep them in functioning condition.

The jungle offers ideal camouflage materials and the Japs use it extensively. This means that surprise is always possible, so training in the use of camouflage and in detection of camouflaged objects and positions should be thorough. Since camouflage and fields of fire are very closely connected, it is well to recall that good fields of fire are constantly sought yet seldom if ever found in jungles. Fields of fire may be completely or partially cleared but not in a narrow lane to expose your position. This should be stressed throughout the training program.

Training will bring out the fact that time is the controlling element rather than distance.

These problems peculiar to a jungle operation may necessitate the adaptation of the infantry division to a particular operation. In many cases the division will not operate as an organic unit but will be broken up into task forces usually containing a regiment of infantry as the basic unit. Other units are assigned as needed to accomplish the mission. A brigadier general is normally assigned as the task force commander. It is not uncommon to have two or more such task forces organized from a division. This breakdown into task forces will normally necessitate the allotment of division staff officers to the various task force staffs as they are needed, leaving a minimum number of staff officers to carry on the necessary work at the division headquarters.

It has been found advisable and in some cases essential to increase the signal detachment personnel of the units. They cannot transport the additional supplies and equipment needed for jungle operation without supplementing their strength either by carrying parties or attaching additional signal personnel from some other signal unit.

In many cases the control of native populations, prisoners of war, police duties, and traffic control require more personnel than is provided in the present military police platoon. Some divisions have had to supplement the strength to enable them to perform these duties in jungle operations.

In jungle operations where hand-carry is necessary the heavier supporting arms are normally reduced in number due to the supply difficulty. Motor vehicle transportation is greatly reduced because it cannot be used efficiently in support of the command. A reshifting of personnel may be necessary to enable the command to provide the needed carrying parties. Antitank guns are very difficult to move in jungles and are seldom used because the jungle precludes the efficient

use of tanks or armored vehicles. On occasion, one or two guns may be hand carried to a forward position for direct fire on enemy defenses, pillboxes, or bunkers.

The use of grenades increases in jungle operations due to the close range of operations and their effectiveness in digging Japs out of their defenses. This requires additional supplies of grenades and increases the transportation problem, for each man will normally carry a minimum of five hand grenades.

In a jungle operation it is well to remember that air cooperation is normally adequate and they make every effort to provide all possible enemy information, yet despite their best efforts neither their eyes nor the eye of the camera can penetrate the dense foliage of the jungle cover. Aerial reconnaissance, both visual and photo, are extremely difficult in the jungles. The heavy, dense overhead growth shuts out all below. Enemy defenses, troops, good jungle trails may be present but cannot be picked up by visual or photo reconnaissance. Photos will give the terrain formation in general but even deep, narrow gorges may be completely hidden by vegetation. While aerial reconnaissance is beneficial it is not always dependable, for you must always remember the observer and the camera can tell or show only those features that can be seen or picked up by photograph.

Jungle operations necessitate thorough training and a high degree of stamina. Regardless of conditions found in the jungle the basic principles of warfare remain the same, but their application to jungle operations may necessitate adaptation to problems of supply, communication, movement, visibility, transportation, and health.

Army Publications Combined

Released by the Director, Maintenance Division, Army Service Forecs.

COMMENCING with the May edition, the Army combined its two major indexes of publications, "List and Index of Administrative and Supply Publications" (War Department Pamphlet 12-6) and "List of Publications for Training" (Field Manual 21-6), to provide a more complete and efficient listing service for the field. The new manual, known as FM 21-6, is entitled "List and Index of War Department Publications." As heretofore, it will be published monthly and distributed down to companies.

The consolidated list and index of publications contains all the listings that formerly appeared in War Department Pamphlet 12-6 and Field Manual 21-6. Of special interest to maintenance personnel is the fact that they can now find complete listings of manuals, circulars, bulletins, orders, forms, and the like between the covers of a single, up-to-date, monthly manual. Among the many publications listed in the new FM 21-6 are Field Manuals, Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, and maintenance forms.

An important feature of FM 21-6 is that new publications are indicated by an asterisk (*). This makes it easy for an organization to make a quick check once a month to assure that it has on hand, or receives, the latest authorized publications.

"Coordination," read the Russian Army regulations, "means integration of the military operations of troops carrying out a common task as regards objective, time, and place. To organize this coordination means to calculate and integrate the efforts of all types of arms at all stages of the battle."

—From the *Soviet War News* as reprinted in *An Cosantóir*

Types of Staff Organization Found in the United States Military Forces

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THE military profession has been a fertile field for advancement in the science of organization. A military force with a more efficient organization has a distinct advantage over its opponent. During the present war, tremendous organizational problems have been forced upon the participants. Millions of men have been taken from all walks of life, drafted into the armed forces, trained, and welded into cohesive fighting units. Industry has been drafted and converted into production for war. New and elaborate concepts of warfare, such as the large-scale amphibious operations or the 1,000- and 2,000-plane bombing missions, have been perfected. A high degree of integration of land, sea, and air operations has been accomplished. In fact, actual integration of the armed forces of many of the United Nations and coordination of the efforts of all United Nations have taken place.

In the solving of these problems many advancements in organization have been effected. They will be studied and analyzed by students of administration for years to come.

In this article, one phase of this study is undertaken—an analysis of the types of staff organization employed by the United States military forces.

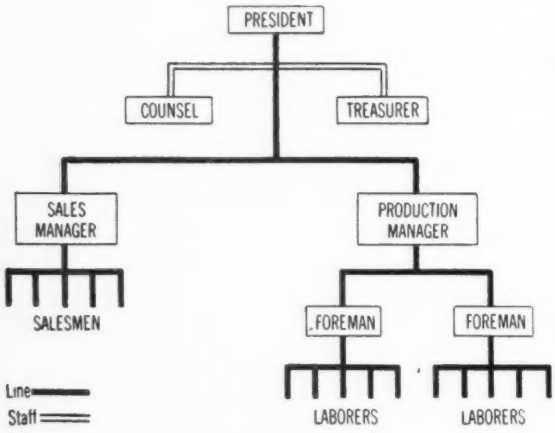

FIGURE 1.
EXAMPLE OF A LINE AND STAFF ORGANIZATION IN INDUSTRY.

Most of us are generally familiar with the concept of a staff, as adviser to the commander of an organization. For example, in the line and staff organization as used by industry there is a line of authority or chain of command from the commander to the subcommanders, to the subordinate subcommanders, and on down to the individual, as shown by the heavy line in Figure 1. In addition, there is a staff of advisers, shown by the light double line.

The staff are individuals, not in the chain of command to the operating units, who furnish information, advice, and supervisory service to the commander. They cannot give orders, except in the name of the commander. Generally, they specialize in certain functions included in the mission of the commander. When the term "staff" is used in this article, it is in reference to a staff group of this character and not to staff in the broad sense which implies all members of the organization.

A. Military Staff Groups

In the organization charts of various units[1] of the United States military forces three different types of staff groups can be identified. We shall give these the following names:

Personal Staff Group.
Specialist Staff Group.
Coordinating Staff Group.

All staff groups found in the army belong to one or the other of these three classifications. Each of these staff groups is distinctly different in function from the other two. Let us consider them one at a time.

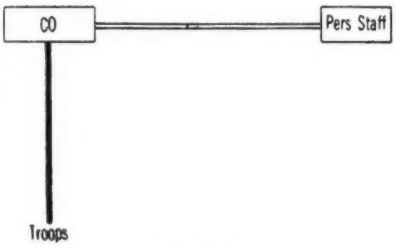

FIGURE 2.
PERSONAL STAFF GROUP.

Personal Staff Group.—The first in the chronological order of development was the personal staff group. It came with the growth in size of military units. For example, in small military units such as the squad, there is no staff. None is required, as the squad leader can exercise command effectively alone. But when we take a larger unit, a platoon or a company, the duties of commanding increase many fold, so the commander designates certain men to assist him, a first sergeant and other assistants. This gives us an organization of the nature shown in Figure 2.

A commander's personal staff group is a part of the office of the commander. In some cases it may be relatively unimportant, consisting only of the commander's aide and secretary. In other instances, however, particularly in Army Service Forces or Air Forces organization, this personal staff group has taken on much greater significance. There, certain special functions over which the commander wishes to exercise close personal supervision are brought up to this personal staff level where they are directly under the commander. A common example is the Control Division.

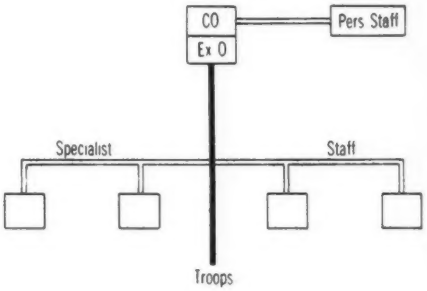

FIGURE 3.
SPECIALIST STAFF GROUP.

Specialist Staff Group.—As we proceed further from smaller to larger units, the personal staff group is not enough. Specialization is needed, so a staff of specialists and an executive officer is added. This gives us an organization such as shown in Figure 3.

In this example there are four specialists on the staff; there may be more, there may be less.[2] Each specializes in one of more of the functions included in the mission of the commander and furnishes information and advice to the commander in respect to his specialty. The executive officer coordinates the activities of the specialist staff group. An example of this type of staff group is found in the battalion.

[1] In the military sense a *unit* is a military force having a prescribed organization. Thus a single unit may include a number of other units. A *commander* is the chief officer of a unit.

[2] Students of administration recognize that no human brain should attempt to supervise directly more than six (Army Service Forces Organization Manual says seven) other individuals whose work is interrelated. For further information on the "span of control" of one individual, refer to *Papers on the Science of Administration*, edited by Gulick and Urwick.

Coordinating Staff Group.—Our third type is the coordinating staff group. As we proceed to still larger-sized military units, such as the division, the number of specialists has increased and the job of coordinating their activities has become greater than the executive officer can handle. In other respects, discussed below, staff coordination has become too burdensome a job for one man. Accordingly, a third type of staff group has been set up to coordinate the work of the specialist staff and the operating units and to assist the commander in the exercise of his command. This is the coordinating staff group, shown in Figure 4. The title of the executive officer changes to chief of staff.

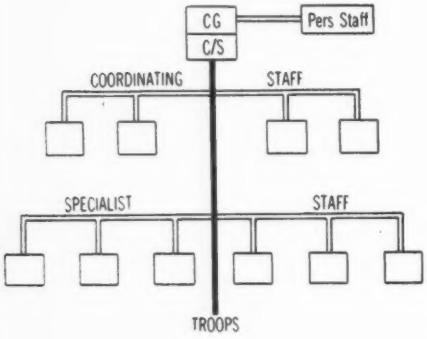

FIGURE 4.
COORDINATING STAFF GROUP.

One authority considers the job of commander as including seven functions: investigating, forecasting, planning, organizing, coordinating, command, and control. None of these functions can be entirely delegated to others; the hard core of responsibility remains. But this coordinating staff group relieves the commander of the burden of most of these functions, so that he can concentrate on the most important—command. Command is not an office job. Under the army system of organization, any general who uses his coordinating staff group properly will find ample time for retaining the "personal touch." He will be able to get down to visit his units and formations, to see for himself what is going on, meet his men unofficially, size them up, stimulate them, restrain them, and otherwise exercise the positive and vital functions of leadership.

In forming the coordinating staff, the commander's job is divided into broad, general groups of related functions and a section of the coordinating staff set up to handle each such group of functions. The coordinating staff sections are responsible, then, for insuring a smooth and efficient coordination of effort between all units of the command. They coordinate the activities of the specialist staff group; they coordinate the efforts of the operating units, and they coordinate the work of the specialist staff group with that of the operating units.

The sections of this staff group perform other duties for the commander. They collect information; they undertake planning at the direction of the commander; they prepare detailed instructions for the execution of the plans of the commander; they transmit orders and instructions, and supervise execution of such instructions.

Officers of the coordinating staff group are not in the chain of command except for their own staff sections, but they have authority delegated to them to issue certain types of orders in the commander's name. Every order they issue, however, is the commander's responsibility.

Thus, while the coordinating staff group does not command, it assists the commander to command. And the commander can retain full responsibility and authority while delegating much of the work of administration.

B. TYPES OF MILITARY STAFF ORGANIZATION

Depending upon how these three staff groups are employed, United States military staffs can be classified into three basic types, which are designated herein as:

Departmental Staff Organization,
General Staff Organization, and
Director Staff Organization.

Departmental Staff Organization.—This is the simplest of the three. It is found in certain smaller headquarters and within sections of larger headquarters. An example is illustrated in Figure 5.

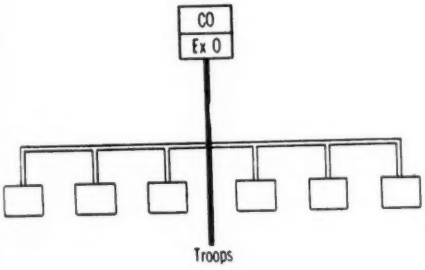

FIGURE 5.
TYPICAL DEPARTMENTAL STAFF ORGANIZATION.

The Departmental Staff Organization is identified by the presence of one and sometimes two of the three staff groups. There may or may not be a personal staff group, but if so, it will generally consist of only the commander's aide.

The characteristic feature of the Departmental Staff Organization is the use of the specialist staff group as the main staff level. In other words, there is no coordinating staff group in this organization because the smaller size of the organization and volume of work do not justify one. This leaves the burden of coordination upon the commander and his executive officer. Care must be taken that it does not exceed their "span of control."

This organization has been called "Departmental Staff Organization" because the principal duties of the unit are divided among several departments or divisions for staff supervision. Each division of the staff is headed by a division chief and furnishes information, advice, and supervisory service to the commander in respect to its function. The staff divisions are not in the line of authority to the troops. This type of staff organization is similar to the line and staff organization of industry.

General Staff Organization.[3]—This is a streamlined organization particularly adapted for use in the field by ground tactical commanders. It is the staff organization of the division and the field army headquarters. It may also be employed by air and service headquarters, especially when such headquarters are dealing principally with ground commands having a General Staff Organization.

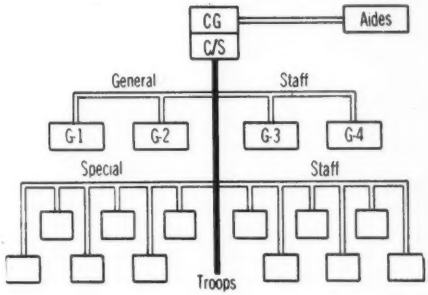

FIGURE 6.
TYPICAL GENERAL STAFF ORGANIZATION.

As shown in Figure 6, all three of the staff groups are found in the General Staff Organization.

The personal staff group is shown at the commander's level, reporting directly to him. For ground units it consists principally of the aides, but for service and air units it may also include control, advisory, or planning sections.

The identifying feature of the General Staff Organization, as its name indicates, is the use of the term "General Staff" to identify the coordinating staff group. This General Staff is divided into four primary sections to agree with the principal command functions of a ground tactical commander, namely, personnel, intelligence, operations and training, and logistics. These functions are assigned to the G-1, G-2, G-3, and G-4 sections, respectively (or A-1, A-2, A-3, and A-4 in the air forces). The General Staff is coordinated by a Chief of Staff and each section is headed by an Assistant Chief of Staff.

[3] This is the organization shown on page 2 of FM 101-5 (edition of 19 August 1940).

The General Staff functions in the manner described earlier for the coordinating staff group. The four G's do not operate; they are not in the chain of command except for their own section personnel. Their job is to coordinate all activities of the command and assist the commander in the exercise of his command functions.

There may be additional sections to the General Staff to meet a local situation. In the European Theater of Operations a G-5 section is used to handle Civil Affairs. In the Pacific Ocean area a G-5 section is used to handle planning. In other cases, additional sections are given a specific name, such as the Procurement Section or the Training Division. The need for such additional sections is determined, of course, by the commander.

The specialist staff group in this General Staff Organization is termed the "Special Staff." This Special Staff is divided into sections to correspond to each of the specialties handled by the particular headquarters, including both administrative and technical services.

Each section of the Special Staff furnishes technical advice and recommendations to the commander and the General Staff in respect to its particular specialty. The sections also prepare plans, estimates, and orders so as to relieve the General Staff of routine duties. Recommendations may be made by the chiefs of the Special Staff sections direct to the commander, but the normal channel is through the sections of the General Staff and the Chief of Staff. The chiefs of the Special Staff sections may outrank the chiefs of the General Staff sections, but in submitting their recommendations to the General Staff sections, chiefs of Special Staff sections are actually dealing with the commander through the agencies established by him to coordinate the different phases of his work.

The chief of a Special Staff section may have an additional role as a unit commander of technical service troops or operating installations. If so, he is "wearing two hats" and his command duties are in addition to his staff function.

Before leaving this General Staff type of organization it is emphasized that each staff level is commanded directly by the commander. No staff section is under the command of another staff section.

Director Staff Organization.—Whether in industry or in military forces, organization must vary to fit different conditions. Organization is not static. When the task to be performed differs, functions will differ and emphasis may change. Then changes in the form of organization may be desirable.

This is what happened in the case of Army Service Forces, Army Air Forces, and certain other organizations in our military forces. Using Army Service Forces as an example,[4] its job was more like that of a tremendous business and the General Staff Organization, which had been developed to fit ground tactical commands, was not well suited to the needs of the ASF. Many additional functions were included in the mission of the Army Service Forces. Forecasting, planning, research, development, procurement, manufacture, transportation, storage, distribution, issue, and administrative responsibilities attendant on the furnishing of billions of dollars worth of supplies and the training, equipping, and transporting of millions of men changed the emphasis on the old sections and created a need for new ones.

A revised type of organization which we have identified as the "Director Type" organization was developed. This revised organization has been modified from time to time since. It has also been adopted, at the direction of Headquarters, Army Service Forces, by the Service Commands and, to the extent applicable, by posts, camps, and stations.

In Army Air Forces a somewhat similar development has taken place and though the titles and duties differ, in most respects the basic type of staff organization is substantially the same. In general, it can be said that this Director Staff Organization is used in place of the General Staff Organization when the mission of the command varies radically

[4] Army Air Forces is an equally good example.

from that of a ground tactical commander.

In the Director Staff Organization we again find all three of our staff groups. (See Figure 7.)

The personal staff group, shown extending from the commander's box,[5] has acquired considerable importance. In addition to the aides, it includes functions which are critical at the time, which are new and in the process of being worked out, or which are tied so closely to the pulse of the organization that the commander wants them in his immediate office. There is no fixed rule as to what specific functions will be included on the Personal Staff. This will be determined by the commander in each case. In Army Air Forces, General Arnold has an Advisory Council and a Special Consultant on his Personal Staff; in Army Service Forces, General Somervell has a Control Division and a Director of Plans and Operations. Other common examples are Labor Relations or Manpower Division, Public Relations Section, WAC Division (during its infancy), Historical Division, Control Division, Statistical Division, Management Board, etc.

The use of the Personal Staff in this fashion has been highly productive in many instances. However, placing a function on the Personal Staff necessitates direct supervision of that function by the commander, and he must be careful not to exceed his "span of control." For this reason, as soon as a function which has been raised to the Personal Staff level ceases to be critical, it should be returned to one of the other staff levels.

The principal feature of the Director Staff Organization is the Director Staff, which has replaced the General Staff of our previous organization as the coordinating staff group. The Director Staff itself is coordinated by the Chief of Staff. The heads of the sections of this staff are often called "Directors" (Director of Supply, Director of Matériel, etc.), which has led to selection of the name "Director Staff Organization" for this type of structure.[6]

[5] In addition to the commander, other members of the organization may have a personal staff; for example, the Deputy Commander or the Chief of Staff.

Let us look at this Director Staff carefully in order to distinguish it from the General Staff. While the duties are similar in the sense that both coordinate the activities of the specialist staff group and the command, there are several important differences.

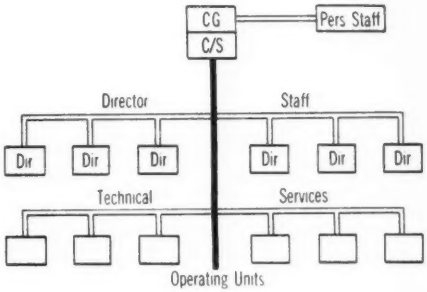

FIGURE 7.
TYPICAL DIRECTOR STAFF ORGANIZATION.

First, we will compare the assignment of duties to the sections. In the General Staff the duties of the four G sections are in accord with the four principal functions of a ground tactical commander. In a Director Staff, however, duties are assigned to sections to agree with a logical breakdown of the functions of the particular commander served. Often these are quite different.

The number of sections included in the coordinating staff group are often different. In the General Staff the number of sections is basically four, with an occasional added section or two (planning, civil affairs, etc.). In the Director Staff the number of sections may vary from three or four to as many as eight, ten, or more. If the number exceeds six or seven, deputy[7] chiefs of staffs will probably be used to strengthen the commander's control.

There is another respect in which the Director Staff often differs from the General

[6] Army Service Forces calls its coordinating staff a "Functional Staff." To avoid confusion with F. W. Taylor's functional organization, that title is not used here.

Staff. The Director Staff may include the administrative services (such as the Adjutant General's Department, the Finance Department, the Judge Advocate General's Department) whereas the General Staff does not. This may be explained as follows: The type of headquarters utilizing a General Staff is dealing primarily with ground-combat operations. Administrative services are of secondary importance. This permits their inclusion in the specialist staff group rather than in the coordinating staff group. In the case of headquarters using the Director Staff Organization, however, the primary mission is often of a service nature. Administrative work increases in volume and importance, and is a function to be carefully coordinated throughout the organization. As a result, the administrative services are often included in the coordinating staff group, either as separate sections of the Director Staff or under other sections of that group.

The specialist staff of the Director Staff Organization is usually called "Technical Services" or "Special Staff." It is divided into sections corresponding to the technical services handled by the particular headquarters. As brought out in the discussion above, it will seldom include any of the administrative services, as they have been moved to the coordinating staff level. Chiefs of this Special Staff usually serve in a dual capacity as staff officers and also as commanders of technical service troops or installations.

Variations.—We have discussed three basic types of staff organization found in the United States Army. In practice an organization may contain features of two or more of these types. Common examples of variations are: combining G-1 and G-4 functions under an assistant or deputy chief of staff for administration; combining G-2 and G-3 functions under an assistant or deputy chief of staff for operations; and grouping all technical services, normally found in the specialist staff group, directly under G-4 or the Director for Supply. Thus mixed types to meet the desire of the commander are often encountered.

Deputies.—Frequently deputies are employed. At first glance, the use of deputies may give the appearance of creating a new type of staff organization. Actually they do not change the basic type. A deputy is one who acts for another, a substitute. If we analyze the duties of a deputy we will find that that is exactly what he is doing. In Army Air Force headquarters there are four Deputy Chiefs of Staff, each of whom acts for the Chief of Staff in respect to certain of his duties.

A "special" deputy is one authorized to act for another in respect to certain designated duties only; a "general" deputy is one authorized to act for another in all matters.

C. Miscellaneous Military Staff Organizations.

There are certain miscellaneous organizations employed by the United States military forces to further staff work.

Committees, Boards, and Commissions.—These are appointed by commanders or higher authority, when required, to take care of special situations that are not effectively provided for in the regular organization. They may be either permanent or temporary, depending upon the purpose for which they are formed. Some examples are: Reclassification Board, Air Priorities Board, Joint Economic Commission, Art Protective Committee.

Joint and Allied Staffs.—A Joint Staff is one including elements from both the United States military and naval forces. An Allied Staff[8] is one including elements from the armed forces of two or more different United Nations, such as the United Kingdom and the United States.

In setting up a Joint or Allied Staff, two methods are used. In the first method, the staff of either party is adopted as the basic staff and a counterpart from the other party is attached. For example, in Italy the Fifth U.S. Army included a British corps which

[7] The function of deputies is described later in the article.

[8] Also called Combined Staff when including elements from United Kingdom and United States alone.

the commander wanted to have represented on the army staff. The regular Fifth Army staff was used as the basic staff organization and the British corps supplied a small separate staff which was attached as a "British Increment." This British Increment was not integrated into the Fifth Army staff but worked as a unit with sections of the army staff on matters in which the British corps had an interest.

The second methods of forming a Joint or Allied Staff is to integrate the staffs. This is the Eisenhower method. Here the two separate staffs are simply brought together. In sections where the two parties have a common interest, the staffs are merged and an officer from one or the other party is placed in charge. In sections in which only one party has an interest, as for example the U.S. G-1 section, each continues to have its own separate staff section. This integration may be used only at the top level or it may be extended down through the two organizations to the degree integration is desired.

Scarlet Pimpernels

From a British source.

FROM the little village of Tempsford in Bedfordshire the Royal Air Force operated two secret special mission squadrons. None of the inhabitants knew that the RAF station near them held one of the war's biggest secrets. These squadrons were the airborne Scarlet Pimpernels of this war.

The squadrons delivered arms, ammunition, radio sets, food, and other supplies to the underground fighters of all the occupied countries. They carried skis and sleighs to the Norwegians and bicycles and bicycle tires (made in England but stamped with the names of French makers) to the underground in western Europe.

There was also a passenger service. Czech, Polish, and Dutch agents were dropped in their own countries, while others were brought back to England for training as saboteurs.

The old unarmed Lysanders and Hudsons in which the "pick-up" flights were carried out had no secret devices to help them operate. Guided only by the dim lights shown by the patriots below, the planes landed in small secret fields to pick up their passengers. The pilot usually flew alone with a map on his knees, for there was no room for a navigator when there were passengers to bring back.

At first, landing conditions were terrible. To improve them, members of the underground were brought back to England, taught where and how to build a landing field, and then flown back. About 700 resistance leaders in all made the trip.

Even though we are strong, we should still direct our main attack against one point only. In that way we shall gain more strength at this point. For to surround an army completely is possible only in rare cases and requires tremendous physical or moral superiority. It is possible, however, to cut off the enemy's line of retreat at one point of his flank and thereby already gain great success.

—Carl von Clausewitz

Army Air Forces Training in the Southwest Pacific Area

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TRAINING throughout the Pacific has been a long process of evolution of unit training in combat to the final establishment of Far East Air Forces Combat and Replacement Training Center in New Guinea.

In the beginning there was little time for training other than to put new crew members with experienced veterans and let them get their training in combat. Later the Fifth Air Force established a training center for new crew members just reporting to the theater, and supplemented this training by additional training given the crew members by the combat unit to which they were subsequently assigned. A similar form of training was used in the Thirteenth Air Force. At General Kenney's insistance the two training centers were combined into the one FEAF, CRTC [Far East Air Force, Combat and Replacement Training Center].

Legally the CRTC is known as the 360th Air Service Group, but throughout the theater it is known and referred to as CRTC. The training center is organized using the Table of Organization and Equipment of an Air Service Group as a basis for personnel plus a bulk allotment of grades and ratings from Far East Air Forces. Operating under the 360th Air Service Group is the 8th Air Service Group, a provisional military police company, a chemical warfare detachment, two quartermaster truck companies, a signal company, and an engineer battalion. The 8th Air Service Group has two airdrome squadrons and two service squadrons within its organization and is charged with the maintenance of all aircraft belonging to the training center. The personnel of the 360th Air Service Group furnish the staff which administers to all student personnel, supervises the training, and coordinates the training and assignment of the combat crews.

Student personnel arrive at the school for the most part as complete crews. However, in some instances partial crews have arrived. In this case the partial crew is placed in ground training without additional personnel if there is a fair chance that the missing crew members will join the crew within a short time. If for any reason it is apparent that the missing crew members will not join the crew for some time, their training is not held up; instead, other partial crews in the same situation are cannibalized and complete crews made up from the incomplete ones, and from then on they are trained as crews. They attend ground school together as a crew, they study and fire as a crew, and they fly as a crew.

Quite frequently in the case of fighter pilots there arises an acute need for a certain type of fighter pilot over and above the number available at CRTC. When this happens, the need is made known to the fighter pilots already at the training center and they are given an opportunity to transfer their training to the type of airplane for which pilots are needed. This is done on a voluntary basis. Those who desire to change are given instruction by veteran instructors on that type of aircraft. Technical Orders are read, the pilot is checked out in the aircraft, given transition time, and, in cases where time allows, flies the airplane in combat before being assigned to his new organization. It may seem incomprehensible that a fighter pilot who has reported to the theater as a P-38 pilot would want to transfer to another type fighter type airplane, yet it has been done numerous times. Similarly, P-51 pilots have expressed a desire to transfer to P-38's, and the transfers have been accomplished, and successfully.

Instructors, one of the most important groups in the training center, are not assigned to the training center at all. In-

structors are furnished by the two air forces for a period of temporary duty usually not to exceed two months. This system serves two very distinct purposes. It keeps instructor personnel with the school who are tried combat crew members and who have come directly from combat with all the latest dope they have gathered from their own experiences in combat and are thus able to transmit their experiences directly to new combat crew members who will be in need of this very thing. Secondly, if there is any particular type of training or procedure that one of the Air Forces feels needs to be stressed, their instructors can provide this instruction in the manner that is desired by the Air Force. At the completion of their tour of temporary duty, the instructors are returned to their organizations and replacements are sent to CRTC to carry on their place. The rotation of instructor personnel is staggered so that there are experienced instructors present at all times. A similar procedure is followed in providing intelligence information to these new combat crews. The CRTC has a permanent intelligence staff, but it is supplemented by intelligence officers from combat units. These latter officers are at CRTC on a temporary duty basis also, and are rotated periodically so that everyone concerned is kept abreast of the latest briefing and interrogation proceedings.

The staff of the CRTC also includes an A-1 who performs all the normal duties of a personnel officer and in addition supervises the troop movement section of the unit which receives, billets, and administers to the student crew members. Through SOP's worked out by personal contact with the Air Forces, the combat crews allocated by FEAF to the Air Forces are assigned by CRTC upon completion of their training direct to groups within the Air Force in accordance with the priority set up by the Air Force.

A-3 of the CRTC is the Operations Officer at the strip who controls all the training aircraft, selects the targets they are to hit, and publishes the field orders necessary to carry out the aerial strikes.

A-4 performs the normal functions of an A-4 with an Air Force or similar headquarters. He coordinates the procurement issuance of supplies, and in addition supervises the expenditure of all classes of supplies.

The Director of Training furnishes all the schedules for training, supervises the instruction given, and constantly checks to see that the methods of instruction are correct and that schedules are adhered to. Whenever an Air Force feels that a particular phase of training should be emphasized to meet a certain situation, it is the Director of Training who modifies his schedules to include whatever instruction is desired by the Air Force. He also, in coordination with the senior bombardment and fighter instructors, supervises the activities of all instructors. The schedules provided by the Director of Training do not confine themselves only to those which pertain to flying. He includes training in instrument flying and procedure. To assist him in this respect he has instrument instructors assigned to the school from the Army Air Forces Instrument Flying School at Bryant Field, Texas. After about three months, these instrument pilots are released to combat units and they are replaced by newly assigned instrument instructors from the Instrument School in the States. Courses are also conducted in navigational aids, gunnery, new enemy tactics, weather, combat technique, jungle survival, etc.

Many synthetic training aids are utilized by the CRTC, some of which they have devised and designed themselves. The course in gunnery is a very complete one. Officer and enlisted crew members fire the entire course from the .45-caliber pistol to the .50-caliber machine gun. A pistol range is provided, instruction is given, and opportunities for practice are provided. Also available are ranges for rifle, carbine, and submachine gun. There is a skeet course, and variations of the regular skeet procedure are employed in addition to the accepted method of shoot-

ing skeet. In addition to the standard skeet range, there are two others, one of which mounts flexible .50-caliber machine guns with .12-gauge shotguns mounted alongside with sights coordinated. By using these "sub-caliber" 50's the waist gunners can shoot skeet using the normal sight, and firing procedure they will use on their guns when they go to combat. The movement of the clay pigeons through the air provides excellent practice in the use of the sigh for leading a moving target. Another skeet range has been modified by mounting various type turrets at the regular shooting stations. Each of the twin 50's in the turret has a sub-mounted .12-gauge shotgun like the flexible guns on the range just described. Gunners are trained in the turrets, and thus become familiar with leading, tracking, and firing from the turret in which they will operate upon graduation. In addition to these standard and modified skeet ranges, there are two other machine-gun ranges. One, the standard machine-gun range, is operated in a normal manner except that when each student steps up to his piece he finds there is something wrong with it, and the malfunction must be discovered before any firing begins. The other range is a moving base range. Located considerably up the valley from the CRTC area proper, a huge oval track has been cut from the kunai grass. The track is nearly a mile around, and set back in the kunai grass are trap houses. A truck with a mounted turret and the shotguns mounted alongside the machine guns proceeds around this track at a fairly good rate of speed. As it progresses around the track, clay pigeons are discharged from the trap houses and fired at by the gunner inside the turret.

An exceedingly comprehensive course in navigation is furnished each navigator, and bomb trainers are in continual operation to keep bombardiers in practice. All methods, such as the Renshaw system, the use of silhouettes, models, descriptions, etc., are employed for the training in aircraft recognition. Not only are the students taught to recognize the aircraft, but they are instructed in the performance of the aircraft they are going to fight. Its range, rate of climb, ceiling, its most vulnerable spots, and also the favorite and most used forms of attack by the various types of enemy aircraft are presented to the students. Also presented are first-hand reports of the various pilots who have encountered new or different forms of attack, how they countered them, and their recommended procedures for pilots who may be similarly engaged by the enemy in the future.

Instrument flying is particularly stressed at CRTC for several reasons. One reason is that it is not always possible to return to your home base when threatening weather closes in. Another reason, and a very important one, is that although some cloud formations in this area look exactly like those encountered in the United States, they are quite different. Air currents within cloud formations vary greatly and adverse weather can be encountered within a very few minutes. In only a few instances are there any intermediate landing fields, and it is essential that pilots be instructed properly so that they may survive the adverse weather, reach their target, and then return to their home base. Instruction is given in BT-13 type airplanes, and the building housing Link trainers is kept full at all times. Classes conducted by competent and experienced weather officers are held in conjunction with instrument instruction.

One of the most interesting and also one of the most important courses is the one conducted by the Australians on jungle survival. Like every other course conducted at CRTC, it is conducted by competent and experienced jungle experts. That their training is worth while is borne out every time one of our fliers returns from the jungle where he was shot down or crashed, yet managed to survive and find his way back. These experienced Aussies, who have lived in the jungle and worked in the jungle for years on end, lecture the students on the type of conditions they may expect in the jungle, the types of edible foods, and the procedure to take if they ever find it neces-

sary to land in the jungle. Most of the natives throughout the theater are friendly to American soldiers, and the correct methods of approach plus the important phrases which are used in asking for the necessities needed by the downed flier are given the student. This course, like all the courses at CRTC, has only its beginning in the schoolroom and then it moves outside. The whole first day is taken up with lectures and instructions, and the second day the class retires to the most logical place to learn jungle survival—to the jungle. Here Aussies and natives demonstrate the points the Aussie instructors have covered in their lectures. A certain edible root looks like this, but here is an actual sample taken from the ground in front of the student's eyes. Certain plants when cut open will provide the student with potable water—like this plant here—and the instructor turns to a certain plant, slices it with a jungle knife, and catches the water that pours out for a sample. Although to a crashed and thirsty crew this liquid is just about the most wonderful juice in the world, it is not to be confused with the actual "jungle juice" found throughout the theater wherever copper coils may be found and a still can be hidden in the jungle. Edible insects are identified, and instruction given as to how they should be prepared. Likewise, poisonous insects, reptiles, and animals are pointed out and instructions given as to where they are most likely to be found and how they may be avoided. A demonstration is given on how to erect a simple but efficient shelter against the elements, which is no small concern. The jungle is tough, but it can be licked by those who know how, and people are learning every day, just as there are people every day who survive its hardships and return to their organization to fly over it again. To the Australians we will always feel grateful for their splendid and effective instruction in this subject.

In addition to this ground training, a Personal Equipment Officer and his assistants provide the crew members with special equipment needed in the jungle. Small compasses, jungle knives, escape kits, emergency kits of survival equipment, and medical supplies, together with many other useful items, are furnished the fliers.

Upon completion of ground school, the crews are assigned an airplane from the school and the afternoon before graduation exercises they take an orientation flight. Graduation exercises are slightly different in this training school located amid the jungle than a person would find back in the States. Final exercises at CRTC consist of a formation of airplanes loaded with bombs and ammunition for a target. Each day there are crews, some fighters and some bombers, that strike enemy installations as a part of their graduating exercises. Thus, before being assigned to a combat unit they have already tasted combat, and already have a period of training during which they are presented the material that other people before them had to get by bitter experience.

Therefore, the more lively the attacks are, the less men they cost. By making your battle short, you will deprive it of the time, so to speak, to rob you of many men. The soldier who is led by you in this manner will gain confidence in you and expose himself gladly to all dangers.

—Frederick the Great

Operation to Secure the Line Carranglan-Digdig, Luzon, Philippine Islands

MAJOR GENERAL INNIS P. SWIFT
Commanding General, I Corps

THE Commanding General, I Corps, on 21 February 1945 gave the 25th Division the mission of (1) advancing to the north and securing the line Carranglan—Digdig, and (2) securing and maintaining the uninterrupted use of Highway 5 from San Jose to Digdig (inclusive) (see Figure 1).

DISPOSITION OF THE 25TH DIVISION

On 21 February, major elements of the 25th Division were disposed as follows:

a. 35th Infantry.—The 1st and 3d Battalions of the 35th were in the vicinity of Rizal. The 2d Battalion was in the vicinity of Bongabon with elements outposting and maintaining road blocks as far south as Cabu.

b. 27th Infantry.—The 1st Battalion of the 27th was in division reserve at the Agricultural School. The 2d Battalion, from positions astride Highway 5, 1,500 yards north of Rosaldo, was exerting heavy pressure on the enemy and attempting to ascertain enemy strength and dispositions by aggressive combat patrolling. The 3d Battalion was occupying and securing San Jose.

c. 161st Infantry.—In order to accomplish the previous I Corps mission of securing the line Mt. Bolokbok—Boulders—Horseshoe Hill, the 161st had been ordered to establish observation posts on the high ground to the west of Highway 5, extensively patrol the area between Highway 5 and Lupao to ascertain enemy strength and dispositions, and locate a possible route for an engineer road to Puncan. The 1st Battalion on 11 February was ordered to move to Balaho with the mission of establishing these observation posts. What was hoped would be a relatively easy job turned out to be a major action by the 1st Battalion. Large enemy forces were found to be occupying strong, well-prepared defensive positions and blocking all routes of approach to suitable observation post sites. However, by 21 February, after ten days of hard fighting by the 1st Battalion, two major enemy positions had been overrun, observation posts had been established, and with great difficulty, due to the rugged terrain and enemy artillery fire, an engineer road had been pushed forward to one of the observation posts. On 21 February, the 2d Battalion was located in Lupao with elements in San Isidro securing those towns, and the 3d Battalion was in Umingan with elements in La Paz securing the division main supply road.

ENEMY DISPOSITIONS

From information obtained by our own patrols, the enemy was found to be in strength in the rugged terrain dominating Highway 5 from both the east and the west. His positions were well prepared and concealed, and there were numerous artillery observation posts. Many enemy artillery positions had been located but neither counterbattery fire nor air bombardment had succeeded in destroying the guns, since they were emplaced in deep tunnels with reveted entrances (see Figure 2). The only big question mark in the enemy defensive organization was the provision made for protecting the Rizal—Pantabangan—Carranglan road. By way of the Pampanga River Valley our patrols had succeeded in entering Pantabangan and had found it unoccupied, but patrols along the Rizal—Pantabangan road had invariably met heavy enemy fire. Reports of enemy in Carranglan were conflicting, with estimates running from five thousand to no enemy in the town.

MAJOR PROBLEMS

Many major and difficult problems confronted the Commanding General of the 25th Division in making his decision for a plan of operations.

a. If he chose an attack north along the high ground astride Highway 5, it meant a frontal assault on well-prepared enemy positions, which at best is a slow, costly operation. In addition, it meant the construc-

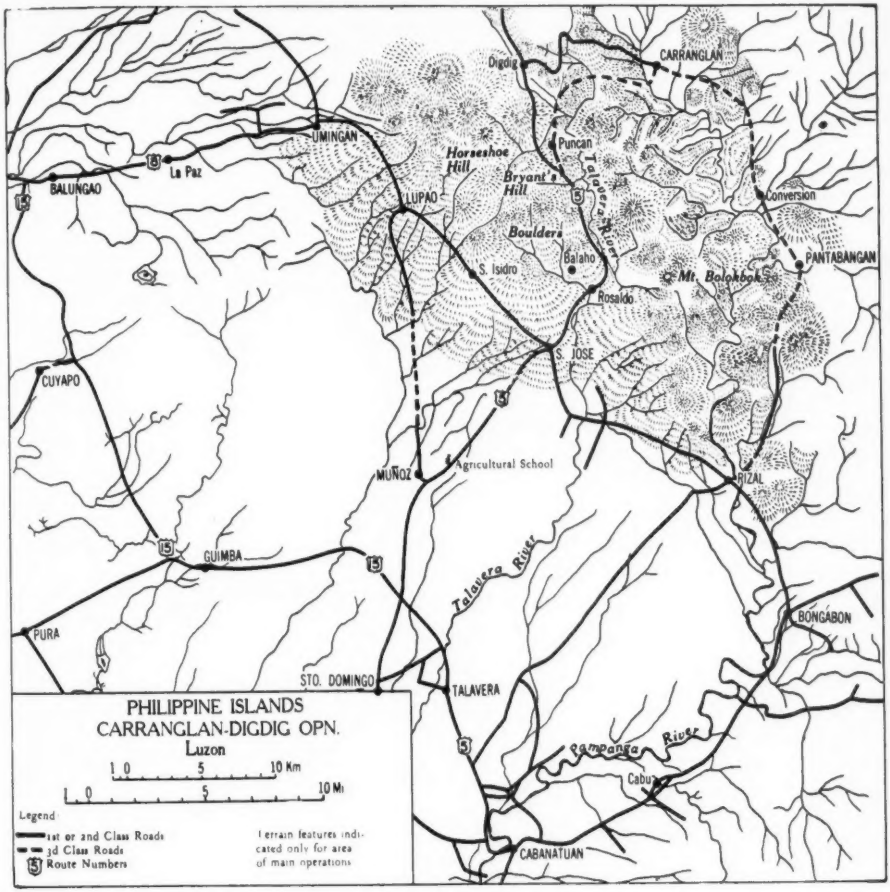


FIGURE 1.

tion of adequate supply roads over the extremely rugged and in places almost impassable terrain. Supply of forward elements under these conditions loomed as a major obstacle. Another consideration was the fact that, if the frontal attack went well, the enemy was in a position to make an orderly withdrawal to other positions farther north and we would only have to fight them again.

b. If the Commanding General chose to hold astride Highway 5 and make a wide envelopment from Rizal via Pantabangan—Carranglan, there was a chance of trapping the enemy but there was again the difficult problem of a thirty-five mile supply and communications route over rugged terrain which would be most difficult to keep open against a stubborn enemy. With communica-

tions difficulties would inevitably follow the problem of control.

c. In addition to the division offensive mission, the Commanding General was still charged with the security of the line Cabu—Bongabon—Rizal—San Jose—San Isidro—Lupao—Umingan. While there were no major enemy forces known to be in the area capable of offensive action, other than those astride Highway 5, the security of this 62,000-yard line while using the bulk of the division in an offensive action did present a problem.

FIGURE 2.
JAPANESE GUN POSITION.

THE COMMANDING GENERAL'S DECISION

After carefully weighing all the factors involved, the Commanding General decided to employ his units as follows (see Figure 3):

a. The 161st was to continue its offensive to the north to seize and secure all the high ridges dominating Highway 5 from the west. If possible, the engineer road was to be pushed forward to a point from which it could be extended into Puncan if necessary. In addition, the 161st was to secure the line Umingan—San Jose (exclusive).

b. The 27th was to exert heavy pressure on enemy forces north of Rosaldo and east of Highway 5 to prevent their withdrawal, and was to be prepared to launch an all-out attack on order.

c. The 35th was to envelop the enemy east flank in a rapid move on successive objectives via Pantabangan—Carranglan with the mission of turning the east flank and overrunning the rear positions.

d. The 25th Cavalry Reconnaissance Troop, reinforced with Company C, 775th Tank Battalion, one platoon of Company D, 775th Tank Battalion, and the reconnaissance platoon of Headquarters Company, 775th Tank Battalion, was to secure the line Rizal—Bongabon—Cabu and the south flank of the division, utilizing extensive motorized patrols.

HISTORY OF THE OPERATION

a. 161st Infantry.—This operation actually started for the 161st Infantry on 11 February when the 1st Battalion was ordered to move to Balaho and advance north to establish observation posts overlooking Highway 5 from the west. By 16 February the 1st Battalion had succeeded in establishing at least two observation posts from which they could observe Highway 5. However, enemy observation posts on even higher ground farther north were directing a heavy volume of artillery fire on our observation posts and it became evident that if our positions were to be made tenable these must be destroyed. Combat patrols seeking routes of approach to the enemy positions met heavy resistance each time they pushed forward, and it was apparent that the positions were strongly held and well organized. The enemy was prepared to make a determined stand.

By 18 February several enemy trail blocks had been destroyed by our combat patrols giving us some freedom of movement, and three major enemy strongpoints had been located. One enemy strongpoint atop what

came to be known as Bryant's Hill had repulsed repeated attempts by Company A to overrun the position, and Company A remained in covered positions at the foot of the hill to prevent this force from supporting other enemy positions. Company C had moved under cover of darkness 18 February after extensive reconnaissance for a route of approach to an attack position to the southeast of an enemy strongpoint approximately 2,700 yards southeast of Bryant's Hill. At the same time, Company B had elements on both sides of an enemy strongpoint in a densely wooded ravine approximately 4,600 yards southeast of Bryant's Hill but had been unable to penetrate the position.

On 19 February Company C directed heavy 4.2 mortar and M-7 fire on the enemy position to their northwest and succeeded in starting large fires on the enemy position. Due to these fires some of the enemy were forced to abandon cover, and Company C was quick to follow up this advantage to overrun the position. The fight was short but fierce. Over one hundred enemy were killed in this engagement.

The morning of 20 February Company B followed in the wake of an air strike to overrun the stubborn enemy strongpoint in the wooded ravine mentioned above, and spent the balance of the day coordinating the consolidation of the positions won with Company C. By 21 February Bryant's Hill remained the only major enemy position blocking the further advance of the 161st.

On 22 February, following the division order to continue the advance north, the 2d Battalion was moved forward to relieve elements of the 1st Battalion southwest of Bryant's Hill and the 3d Battalion took over the security of the line La Paz—Umingan—San Jose (exclusive). On the morning of 24 February, following an air and artillery preparation, the 2d Battalion began the assault on Bryant's Hill. By 0930, elements of the 2d Battalion had succeeded in overrunning the northwest portion of the objective in spite of fierce enemy resistance. On 25 February the remainder of the position was overrun, and by 27 February the last enemy straggler had been wiped out and an excellent observation post overlooking Highway 5 was established on Bryant's Hill.

During the 2d Battalion action the Commanding Officer, 161st, had ordered the 3d Battalion to move forward to positions south

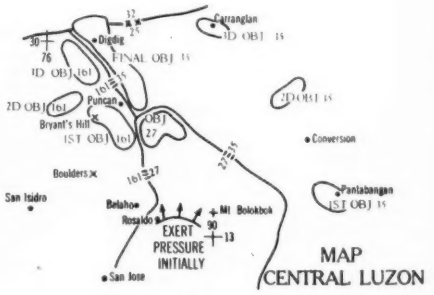


FIGURE 3.

of Bryant's Hill prepared for further offensive action. The 1st Battalion (less Company A) had been ordered into division reserve at the Agricultural School with Company A securing the line La Paz—Umingan—Lupao.

It developed that Bryant's Hill was the keystone of enemy defenses west of Highway 5. After that position had been secured on 27 February until the completion of the operation on 5 March, elements of the 161st continued their advance north but met only minor resistance. There were frequent patrol clashes and many enemy stragglers were discovered and destroyed, but the backbone of the enemy's defense west of Highway 5 had ben broken when Bryant's Hill fell.

One of the outstanding features of the operation of the 161st was the construction of 16,000 yards of engineer supply roads by Company A, 65th Engineer Battalion, over the extremely rugged terrain west of Highway 5. In many places the construction was pushed forward in spite of enemy attempts to force our engineers to stop work by placing artillery fire on the work parties.

b. 27th Infantry.—After the division order of 21 February, the 3d Battalion was moved to the Agricultural School to replace the 1st Battalion as division reserve. The 1st Battalion moved into position north of Rosaldo and east of Highway 5 prepared to attack north on order. The 1st and 2d Battalions continued to exert heavy pressure on the enemy to the north by extensive patrolling with exceptionally strong combat patrols. Due to the rapid progress of the 35th in its envelopment on the east, the Commanding General ordered the 27th to commence its attack north on 24 February.

The Commanding Officer, 27th, had selected three key terrain features as successive objectives in each battalion zone of advance. Each of these terrain features was an enemy strongpoint or observation post. The actions to seize these objectives followed the same familiar pattern. Each was stubbornly defended to death by the enemy, and as soon as an objective was overrun, enemy artillery would commence firing on our forces. The rugged nature of the terrain made operations and supply more difficult than normal. There were the usual attempts by the enemy to infiltrate our positions at night with no success. Sharp clashes continued until 2 March when the 27th succeeded in securing all objectives in sufficient strength to repulse any enemy attempts to retake the ground. Operations for the period from 2 March to 5 March consisted mainly of numerous strong patrols clearing the remaining enemy forces from ravines and isolated pockets in the area. During this period, from twenty-five to thirty-five enemy per day were killed.

On 28 February the 3d Battalion had been relieved as division reserve and attached to the 35th Infantry to assist it in securing its long supply route. During the operation, Company B, 65th Engineer Battalion, had done an outstanding job of constructing over 10,000 yards of supply roads through the rugged terrain both to the east and west of Highway 5.

c. 35th Infantry.—The 35th, after having been relieved of the mission of securing the line Rizal—Bongabon—Cabu by the 25th Cavalry Reconnaissance Troop (reinforced), assembled in Rizal by 22 February. The advance to seize the first objective, Pantabangan, jumped off at 0715 the morning of 23 February with the 1st Battalion advancing in column of companies up the Pampanga River Valley and the 2d Battalion advancing along the high ground astride the Rizal—Pantabangan road. Only light resistance was met, and by dark, 23 February, both battalions were in Pantabangan. The 1st Battalion was left to occupy Pantabangan and patrol east to the corps reconnaissance line. The 2d Battalion continued the rapid advance north. On 25 February the 3d Battalion was moved from Rizal to Conversion by motor to continue the advance on Carranglan with the 2d Battalion.

On 26 February the anticipated attempt of the enemy to cut the long supply route of the 35th materialized when a bulldozer working the Rizal—Pantabangan road was knocked out by enemy fire and an estimated seventy-fire enemy troops took up positions on the high ground dominating the highway on either side.

On 27 February, 27th Company K was moved north of Rizal by motor to launch an attack on the enemy block, coordinated with elements of the 1st Battalion coming south. By 28 February the road was again open except for occasional sniper fire, and the 3d Battalion of the 27th had been attached to the 35th to assist in keeping the long supply route open.

On the night of 25-26 February, while the enemy force attempting to cut the supply route was moving into position, another major enemy force launched a vicious attack on the leading elements of the 2d Battalion just south of Carranglan. The attack was successfully repulsed with forty enemy dead counted the following morning and an unknown number of enemy wounded. After this blow, Carranglan was easily occupied by the 2d and 3d Battalions by 1230, 26 February.

The advance to Carranglan had been hindered by only one major enemy attempt to

halt it. It seemed certain that the enemy would make a major stand somewhere to the east of Puncan and Digdig. The advance of the 35th became a little more cautious with strong patrols preceding as a covering force.

The 2d Battalion, in its advance on Puncan, had chosen to occupy Puncan Mountain dominating that town prior to entering the town itself. This advance was not strongly contested by the enemy but the extreme ruggedness of the terrain made it a difficult undertaking. By 2 March Puncan Mountain had been secured and elements of the 2d Battalion moved into Puncan and secured that town. Company E, pushing north from Puncan to contact elements of the 3d Battalion in the Digdig area, met heavy fire from a well prepared and concealed enemy artillery position to the west of Highway 5. The enemy guns were emplaced in deep tunnels in sheer cliffs and were well protected by small-arms fire. The three 105-mm and one 75-mm gun were firing point-blank fire on our troops. It was impossible to envelop the positions with foot troops due to the sheer cliffs, so M-7's and armored assault guns were moved forward under cover of a smoke screen to take the position under direct fire. The last enemy gun was destroyed on 4 March in close-in assault by flame throwers and demolitions crews to end all organized resistance in the area.

Meanwhile, the 3d Battalion advancing on Digdig met heavy resistance from a well entrenched enemy force southeast of that town. In a hard all-day fight at close quarters using grenades and flame throwers, the enemy force was finally destroyed. Several groups of the enemy were found to have committed suicide by holding grenades to their bodies when they realized that their position was hopeless. Many of the emplacements were found to be connected to underground tunnels, some of which were more than thirty feet in length. After completing the mopping up of stragglers in the area, elements of the 3d Battalion occupied Digdig the morning of 3 March. By 5 March, after the 2d Battalion had knocked out the last remaining strongpoint on the previous day, Highway 5 was declared open from San Jose to Digdig (inclusive).

General Comments

Enemy casualties for the entire operations were 1,506 killed and nine prisoners. Our losses for the same period were sixty-five killed and 196 wounded.

Enemy matériel destroyed or captured included forty-five rifles, eighteen light machine guns, twelve heavy machine guns, seven antitank guns, eleven artillery pieces, nine mortars (two 150-mm type), forty-nine vehicles of all types, and large quantities of supplies, and ammunition of all calibers.

To support the operation, combat companies of the 65th Engineer Battalion built forty-eight miles of road over average elevations of 1,500 feet with elevations as high as 2,500 feet reached in several places. The grade in some places was a steep as thirty-eight degrees. In one section, the road descended from a 2,500-foot elevation to 900 feet in less than 300 yards horizontal distance. Forty percent of the length of the road entailed sidehill cuts and much blasting. In addition, forty miles of supply roads were put into condition and maintained. The work of the engineers throughout the entire operation was outstanding.

Close support furnished by regimental cannon companies (M-7's) and Company D, 98th Chemical Battalion (4.2 chemical mortars) was of the highest order and contributed materially to the success of the operation.

Conclusion

Successful operations against well-prepared enemy positions over rugged terrain are possible only if adequate time is allowed for careful reconnaissance and the construction of roads over which to move supplies and heavy supporting weapons. Without the benefit of heavy close-support weapons capable of delivering a heavy volume of accurate fire on enemy positions, the enemy could hold out indefinitely. Assault by foot troops without heavy suporting fires would be costly if not impossible.

Development of Tactical Doctrine for Employment of Amphibian Tanks

MAJOR JOHN T. COLLIER, *Cavalry*
Executive Officer, 776th Amphibian Tank Battalion

AMPHIBIOUS combat in the Pacific has brought to our armed forces wide experience in a type of warfare hitherto unknown on so vast a scale. And American arms, in turn, have brought impressive new methods and matériel into the ocean and land areas where such war is being waged. Experience in this theater has endowed our Army and Navy with a surpassing knowledge of the mechanics of amphibious operations, of specialized problems which they pose, and of solutions that work.

AMTANKS FIRING HOWITZERS FROM THE WATER AS THEY MOVE SHOREWARD.

A significant example of the solutions that work is the amphibian tank—dubbed "amtank" by the Army troops who man them. Designed to meet one of the specialized problems of amphibious operations, the amtank was first used to neutralize enemy fire from landing beaches during the interval between the lifting of naval gunfire and the landing of assault waves of infantry. Like the land tank, the amtank made a modest and unheralded entry into combat. Its first appearance achieved surprise. Also like the land tank, it has been found to possess uses far beyond those for which it was originally conceived.

In the assault of Jap-held atolls in the Pacific, it was found that the enemy was often able to emerge from cover and re-man defensive positions from which the naval bombardment had caused him to withdraw. Enemy reoccupation of these beach positions occurred after naval gunfire had been lifted to allow our troops to land. Moving shoreward in coral-climbing LVT's—another innovation of the Pacific war—our forces were brought under direct fire before they could gain the beaches in these open vehicles. This resulted in the adoption of lightly armored, turreted LVT's, equipped with 37-mm guns, coaxial machine guns, and gyro-stabilizers. These early models were, in fact, amphibious light tanks. Their mission was to constitute the first wave of a landing, and place cannon and machine-gun fire on the beaches during the ship-to-shore phase of the assault. Ashore, they engaged suitable targets to a limited extent in the manner of land tanks, and helped secure the beachhead.

The mechanical evolution of the amtank has been rapid, and the doctrine for its employment—though not yet codified in field service regulations—has kept apace. Both mechanically and tactically the amtank has evolved to the point where it has ceased to be a tank. It has become a self-propelled amphibious artillery piece, and wider exploitation of its capabilities as such points to revolutionary developments in field artillery for amphibious operations.

New and expanded concepts for the employment of amtanks were crystallized when the Army's 776th Amphibian Tank Battalion, then in Hawaii, was issued new type amtanks armed with 75-mm howitzers. This battalion had experimented with such equipment prior to departure from Fort Ord. The new vehicle,

designated LVT A4, is a seagoing M8 assault gun. Latest models have a bow machine gun.

Lieutenant Colonel O'Neill K. Kane, Commanding Officer of the 776th, conceived the employment of this battalion not merely as a means of assaulting the beach and providing limited fire support ashore, but as *actual field artillery*. Control would be exercised through artillery observers and liaison officers regularly attached to the infantry battalions. Supporting fire, controlled by observers in this manner, would be the most effective possible. And it would be available hours before the division artillery itself could be brought ashore.

"GROUNDING TRACKS." AMTANKS CLIMB OUT OF THE SURF.

Permission to train the battalion in field artillery methods was granted by Major General A. V. Arnold, Commanding General of the 7th Infantry Division. The 776th was attached to this division for the Philippine and Okinawa campaigns. General Arnold, himself an artilleryman, provided experienced instructors, fire control equipment, and ranges for training the battalion in its new additional role.

Unlike the infantry cannon companies, whose track-laying weapons are similar, the 776th Amphibian Tank Battalion has adopted basic field artillery organization and practices. The bulk of its fire is now indirect fire, all of which is controlled by artillery observers.

Conversion of the battalion had to be accomplished within the framework of tables of organization and equipment [T/O & E] suitable only for an amphibian tank battalion trained for direct fire missions and employed as originally contemplated. At the present time there is no T/O & E for an amtank unit organized to provide artillery support. No provisions are made in current allowances for fire direction center or wire personnel and equipment, and the personnel available at the guns is not fully adequate for long-sustained firing. In this battalion, as in other amtank units which have followed its example, fire-direction, wire, and other essential personnel not provided for in the T/O & E had to be trained from personnel made available by the reduction in the number of vehicles occasioned by the conversion, or taken from other duties within the battalion. The battalion commander and his staff have prepared a proposed T/O & E, based on combat experience in the Philippines and in Okinawa, which has been submitted to the War Department for consideration.

"PASSING THE AMMUNITION."

The method of operation of an amphibian tank battalion trained and equipped to provide artillery support is described in the Standing Operating Procedure published by the 776th Amphibian Tank Battalion on

20 March 1945, and subsequently given limited circulation among service schools and certain higher headquarters.

Early maintenance support is made available on the beach or at the gun positions by the battalion maintenance section, which lands on order of the maintenance officer. The maintenance amtracs [amphibious tractors] of each company, fitted as second echelon shops, are initially centralized under battalion control. Medical support and evacuation facilities, mounted in LVT's, are available to the assault landing waves. The amtank battalion has two medical officers, each mounted in an amtrac equipped for evacuation of casualties and carrying a jeep rigged with litters. Each of the two amphibian tractor battalions operating in the division landing zone has a medical officer with amtrac, and pooling of these four vehicles provides a medical LVT for each landing beach.

IN BATTERY POSITION.

Employment of the 776th Amphibian Tank Battalion with the 7th Infantry Division was essentially as described above in the major landings on Leyte and Okinawa. More initial resistance was encountered on Leyte than Okinawa, but in the latter operation the battalion has had more extensive use as artillery. This fact is attributable in part to the greater need for mass artillery on Okinawa, and in part to a better road net which accommodated the amtanks in their advance across the island.

The Leyte campaign provided a veritable proving ground for amtanks, and a variety of innovations in their employment were introduced by the 776th Amphibian Tank Battalion. After fulfilling their primary and secondary missions in the initial assault, the amtanks of the 776th were put to work as land tanks, as cavalry, and even as surface craft at sea.

While not a new use, the battalion's experience with vehicles used as land tanks was of interest. It was most effective during the initial advance inland, when, working with (but not attached to) the infantry battalions, the amtanks knocked out pillboxes and other enemy installations by direct fire. This action was purely incidental to the movement of vehicles into battery positions from which artillery support could be given.

One of the reasons which makes amtanks unsuitable for extensive land tank missions is that employment as land tanks is usually effected at the expense of indirect fire support which the equipment is better suited to render. It is recommended that the use of amtanks as land tanks be held to an absolute minimum. In such employment the likelihood of loss of highly specialized personnel and equipment is great, and both are extremely difficult to replace.

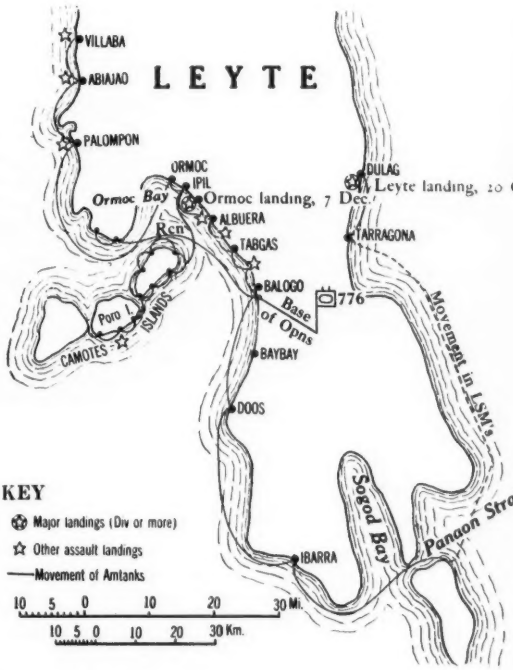
The 776th Amphibian Tank Battalion established the feasibility of long water movements of LVT's when amtank elements made a spectacular voyage under their own power from the Panaon Straits, at the southeastern end of Leyte, to the 7th Division's zone of action between Baybay and Ormoc on the west coast (see map). This was by far the longest movement of amphibious vehicles ever attempted, and there was nothing by way of precedent to guide the battalion commander in his planning and logistical estimates. The previous record is believed to be about twenty miles, made by Company D of the 776th when that company was on the Palau operation with the 81st Infantry Division.

In the move from the Panaon Straits, the

unit bivouacked ashore at night and accomplished essential maintenance. All necessary supplies were brought in the amtracs of an attached company of the 718th Amphibian Tractor Battalion, since no logistical support from shore was practicable. All vehicles reached their objective with personnel and equipment ready for combat. The initial movement was nearly a hundred miles; tactical operations which followed immediately raised this by twenty-five miles, and by the end of the campaign some of these vehicles had accrued a total of 200 miles of water operation. These same vehicles are still in operation, now on Okinawa.

In the operations on the west coast of Leyte the amtank unit was employed principally as a raiding force; press dispatches referred to it as "sea cavalry." The 7th Division was attacking north toward Ormoc against strong enemy positions in the coastal range of rugged hills. The enemy occupied reverse slopes, and it was often impossible to reach his positions with artillery fire. The amtanks, operating from bases immediately in rear of the front lines, made unsupported envelopments by sea, coming ashore behind the Jap lines.

The first of these waterborne amtank attacks was launched at dawn on 5 December. En route to the chosen landing area at the mouth of the Tabgas River, the amtanks made a feint and shelled the Jap-held towns of Tabgas and Balogo from the water. The attack achieved complete surprise, and before the enemy could turn his field guns and mortars on the amtanks, considerable damage had been done. The mission accomplished, the amtanks put to sea without casualties. Four such attacks were made, each coordinated with an attack overland by the infantry. On 8 December the amtanks landed at the Jap-held town of Albuera, continued point-blank shelling ashore, and destroyed a large supply dump. Enemy communications were disrupted, and the defense of his coastal main supply road was disorganized. Although each attack brought the amtanks under fire from enemy mortars and 75-mm guns, no casualties resulted. Tribute to the amtanks was paid by an exaggerated "newscast" from Radio Tokyo which announced that "400 American amphibious tanks were destroyed" in these operations.



LEYTE OPERATION OF THE 776TH AMTANK BATTALION UNDER XXIV CORPS.

Still another amphibious innovation was to be introduced in closing stages of the Leyte campaign when Major General John

R. Hodge, commanding the XXIV Corps, directed the formation of an LVT-infantry task force to cross Ormoc Bay, land in rear of enemy forces retreating on Leyte's western peninsula, and seize their last base at Palompon. The amphibious task force, consisting of a reinforced battalion of the 77th Division, was then to wait for the remainder of the division to effect a juncture after an overland movement. This operation was unique in three respects. It was the longest movement across open sea ever attempted with amphibious vehicles—thirty-eight miles. The entire assault force was transported the whole distance, shore-to-shore, in LVT's. And the only artillery to accompany the task force was a reinforced company of amtanks of the 776th Amphibian Tank Battalion. The overnight crossing of Ormoc Bay was made on Christmas Eve, and the success of the operation completely justified reliance upon the amtanks for all of the artillery support. In precisely the same manner, an LVT-infantry task force from the 7th Division, led by amtanks of the 776th, made an overwater movement to wrest the Camotes Islands from the Japs last January. As at Palompon, amtanks provided the artillery support. Resistance in these small islands was as stubborn as any encountered in the Pacific, and the entire Jap garrison had to be annihilated. Continual pounding of strong enemy positions by the amtank batteries contributed much to the success of this operation, which ended in a suicidal banzai attack.

The successful employment of amtanks as artillery, especially where they furnished the only artillery support, suggests a new type of division artillery developed especially for amphibious operations. The advantages of moving artillery ashore under its own power are obvious: great economy in shipping space could result, and the artillery would be ashore as quickly as there was need for it. There are no insurmountable technical obstacles in the way of building improved LVT's mounting 105-mm howitzers.

Meanwhile, with existing equipment and improvised organization, the amphibian tank battalion is capable of filling the important gap between the lifting of naval gunfire and the landing of infantry, and the equally important gap between the landing of the infantry and the division artillery. It is yet a new weapon, and the varied experiences of the 776th Amphibian Tank Battalion in the Palaus, Leyte, the Camotes, and Okinawa have revealed new uses which have withstood the test of combat. The most important of these may well be as water-borne field artillery.

The Plan

Brigadier L. M. Campbell, VC, DSO, TD, in *Aim*, army magazine of the British Middle East Command, No. 41, April 1945.

A clear, simple, well-thought-out and well-explained plan is essential in every operation, however small. When you are making it, picture in your imagination the progress of the operation. Try actually to see the troops crossing the river or climbing the hill. This will help your plan to meet the possible difficulties before they arise. Try to see your plan as a complete and logically arranged whole. This will help you to explain it to others.

A simple plan always pays. Unless you are dealing with exceptionally skilled and intelligent men, a plan which is not gin-clear from start to finish, a plan which is full of "if" and "when" and "provided that," courts disaster. The ideal to aim at is a plan in which you can say to every unit and every man, "You will go from here to there. When you get there, you will hold on till all is blue. And that is all I want from you."

Men given an object like that will know exactly what they have to do and all they have to do and will always attain it.

Barriers for Defense

MAJOR JOHN S. SHAPLAND, *Corps of Engineers*
Instructor, Command and General Staff School

OUR forces are on the offensive in all theaters, yet as long as the enemy is capable of attacking with armored forces, barriers to that attack should be established to ensure the success of our mission. Because of the immense amount of time, labor, and material expended in providing all-around barrier systems, they will seldom be as complete as desired, and planning for their construction or improvement must be a continuous process. This planning requires that division, corps, and army staff officers have an understanding of the principles of barrier systems and an appreciation of the staff coordination required in barrier planning.

AN ARMORED UNIT DELAYED BY A CRATER BLASTED BY RETREATING GERMANS NEAR RECHICOURT, FRANCE, WHILE A BULLDOZER FILLS THE CRATER. (U.S. ARMY SIGNAL CORPS PHOTO.)

A barrier is a continuous band or zone of natural and artificial obstacles across an expected avenue of enemy approach. When integrated into a defensive position and covered by artillery and automatic-weapons fire, barriers strengthen the position materially by imposing delay on the attacker. This delay may provide an opportunity to engage the attacking element by fire power, give the defender time to readjust his forces to meet the enemy attack on the terrain most favorable to the defense, or allow time for mounting a counterattack to destroy the enemy. Barriers may also be used to force enemy attacks into the avenues of approach where they can be defeated by active antitank defenses or to help protect the flanks and rear of a command on the offensive.

Coordination of the means of antimechanized protection is a command responsibility. To ensure integration of the barriers into the plan of defense, their location and construction must be based on a comprehensive barrier plan. In each of the higher command echelons, this barrier plan is worked out for the commander by the staff engineer in cooperation with the general—and special—staff officers of the unit.

General barrier plans and policies are

dictated by the army commander, or by the corps commander when the corps operates independently. These plans include directions for construction of specific major barriers incorporated into the army plan of operation, restrictions on the location and types of obstacles used, and precautions taken to maintain security of the barrier plan. Instructions for reporting locations and types of obstacles may be included.

The corps commander issues barrier plans in more detail, accompanied by maps or overlays showing the location of the major barriers and the locations of gaps in the barriers. The corps plan is based on a thorough terrain study backed up by ground reconnaissance. Responsibility for construction is delegated to corps troops and to divisions. Restrictions established by army are included with any further restrictions imposed by the corps commander to fit the barrier system into his tactical plan.

Division barrier plans are even more detailed. In addition to incorporating barrier locations and restrictions laid down in the corps plan, the division barrier plan may add other barriers and restrictions. The location, type, and strength of the artificial obstacles used in the barriers are frequently prescribed. The assignment of construction tasks to subordinate units, priority of construction, location of gaps with orders for their closing, and expected time of completion are also specified. Units must be designated to defend each of the barriers.

The unit engineer, in formulating the barrier plan, must consider principally the location, strength, priorities of construction, location of gaps, restrictions, secrecy, material requirements, and availability of troops

ENGINEERS LAYING A MINEFIELD IN EASTERN FRANCE.

for construction and defense. The plan must be coordinated with G-3 to ensure that it fits into the tactical plan of the unit and to ascertain what troops are available for construction and defense. The antitank artillery officers will also be concerned with the location of barriers and plans for their defense. Material requirements are high; therefore, requirements must be anticipated well in advance to permit moving the materials forward. G-4 must be consulted in connection with material and transportation requirements, routes to be left open for the movement of supplies, and the protection of supply installations. The ordnance officer, quartermaster, and provost marshal will be interested in these same items. Counterintelligence measures will be of interest to G-2. When civilian control is necessary to maintain secrecy of mine-field locations, G-1 will be concerned. These are some examples of the ties of staff coordination required in barrier planning.

In order for the barrier system to provide balanced protection throughout a large area, contiguous units of all echelons must coordinate their planning. They must also cooperate in determining the location of obstacles and gaps in the barriers between the units, and in determining the responsibility for their construction if these points have been omitted from the orders from higher echelons.

EXPLOSIVE CHARGES PLACED ON TREES SO THEY MAY BE BLASTED TO MAKE A ROAD BLOCK. GERMANY. (U.S. ARMY SIGNAL CORPS PHOTO.)

In locating barriers, a cellular system is sought in order that the breaching of a barrier by the attacker will leave him confronted with other barriers regardless of which direction he turns. This will delay the enemy within the cell while dispositions are changed to stop the attack or to launch a counterattack to drive him from the area. The size

of cells will depend on the natural obstacles in the area, the time and means available for the construction of artificial obstacles, and the means available for defense. In a deliberate defensive position, cells may be so small that they include individual front-line battalions, while farther to the rear cells will be larger.

In order to save materials, labor, and time, it is imperative that barriers be located to incorporate natural obstacles in so far as practicable. In nearly all situations it would be impossible to complete an effective barrier system made up of artificial obstacles alone. Often barriers along strong natural obstacles, such as wide, unfordable streams or extensive swamps, can be effected with little difficulty. Commonly encountered minor obstacles may be incorporated into barriers and strengthened sufficiently with moderate effort. On the other hand, obstacles in open country require great expenditures of effort. In locating barriers, map study is frequently deceptive. Creeks with steep banks may be stronger obstacles than wide, shallow rivers. Only a thorough ground reconnaissance can determine which terrain features are suitable for incorporation into the barrier system. The effect of each barrier on tactical and logistical plans must be carefully considered so as not to block prematurely routes to be used for counterattack, communication, or supply.

The strength of a barrier is an important element in its efficacy. Strength is best measured by the delay which is imposed on an enemy who attempts to breach the barrier. However, this delay is difficult to measure in advance because many variable factors are involved. If the enemy strikes a series of obstacles at night, the delay may be much greater than in daylight. Likewise, a barrier strongly defended by fire imposes a much greater delay on the enemy than one which is undefended or inadvertently covered by fire. The delay imposed may vary with changes in the weather. If the barrier surprises the enemy, either as to location, type, or strength, he may be held up by it for a considerable time while making preparations to breach it. In addition, if the enemy is surprised by an obstacle and forced to negotiate it under fire, his losses may be great. While strength of barriers usually cannot be measured quantitatively, the relative strength of various barriers is less difficult to determine. This consideration enables the making of the more important barriers relatively stronger than less important ones and permits the blocking of good avenues of approach with relatively stronger obstacles than those used in less probable areas of enemy attack.

Because of shortages of materials or troops, it is seldom possible to construct as complete a barrier system as is desired. By establishing priorities, the planning agency insures that the barrier system will have the maximum effectiveness at any stage of construction. Highest priority is usually given to covering and flank barriers, intermediate priority to obstacles in front of the principal barriers, and lowest priority to additional barriers in rear of the main battle position. Material and labor factors may limit rear-area barriers to prepared bridge demolitions and road blocks.

The location of gaps necessary to the tactical and logistical plans of the issuing unit is specified in the barrier plan. Gaps may be necessary to permit communication, movement of supplies, or movement of covering, reconnaissance, or counterattacking forces. The responsibility for guarding and closing each gap must be carefully delegated to obviate capture of the gap intact with consequent neutralization of the barrier. Not only must the person responsible for closing the gap be designated, but he must be told when or on whose orders to close the gap, and he must be given instructions to close the gap without further orders if necessary to prevent its falling intact into enemy hands. Examples of failure to close gaps in major barriers at critical times with consequent partial neutralization of the barrier are numerous. An outstanding instance was the failure of the Germans to demolish the bridge over the Rhine River at Remagen.

Restrictions may be imposed by the barrier plan in order to limit subordinate units in

the location of obstacles, methods of construction or destruction, use of materials, and location of gaps. However, such restrictions should not be more inclusive than is necessary to make the barrier plan workable. Too many restrictions will limit the ability of subordinate commanders to effect an adequate barrier system with the means at hand.

To increase the probability of obtaining the longer delay which may be imposed on the enemy if he is surprised by an obstacle, secrecy is mandatory. However, secrecy should not be so extreme that it deprives units of the knowledge of the location of barriers or gaps when such information may affect accomplishment of their mission. The construction of obstacles in locations where work cannot be observed by the enemy will aid in maintaining secrecy. Where possible, as in the case of mine fields, obstacles should be concealed to keep the enemy from securing information of their location and strength. Obstacles should be protected from infiltration of enemy reconnaissance patrols. Stringent civilian control is necessary because one of the best sources of information on the location of obstacles is from civilians who have observed the construction. Special precautions must be taken to keep barrier plans and records of the location of mine fields or other obstacles from falling into enemy hands.

Material and transportation requirements for a comprehensive barrier system may be very high. Labor requirements will vary widely. These factors depend on many variables, some of which are the natural strength of the terrain, materials and equipment available, the type and training of troops employed on construction, and the availability of troops other than those responsible for construction to guard the barriers. Staff engineers can estimate these factors with sufficient accuracy to determine whether the plan is capable of completion with existing means in the time available.

Results which may be expected from a good barrier system are of sufficient importance for barriers to merit careful consideration in the development of the defensive plan. In any operation, attack or defense, the staff should evolve a current barrier plan capable of being executed with the least possible delay. High priority barriers should be begun as early as troops and equipment are available, and should be strengthened whenever possible to help prevent enemy attacks from interfering with the accomplishment of the units mission.

A JAPANESE ANTITANK DITCH ON BUTARITARI ISLAND, MAKIN ATOLL. (U.S. ARMY SIGNAL CORPS PHOTO.)

Obstacles were used with telling effect by the Germans in North Africa and Europe. United Nations forces used few barriers during the rapid offensives in Europe, but constructed barrier systems rapidly to help contain the breakthrough by the Germans at the end of 1944. The war against Japan offers other situations where barriers, particularly against personnel, are valuable in breaking up fanatical banzai charges. The general principles discussed here apply equally to barriers used in the Asiatic theater.

Quartermaster Supply in an Armored Division in Combat

LIEUTENANT COLONEL HERBERT F. KRUCKER
Formerly G-4, Fourth Armored Division

PRIOR to movement to Normandy, it was anticipated that the system of railhead or truckhead distribution to an armored division would not always function and some provisional system would have to be instituted by the division to insure breakdown of supplies received by the division to the units within the division. Fuel supply would be the greatest problem, but breakdown of Class I and Class II quartermaster items to elements of the division and attached units would cause many problems to arise, because of the lack of organic personnel to accomplish this task.

Divisions were required to submit consolidated division requisitions in most cases for all types of supply. Army railhead companies operating truckheads and dumps serve several divisions including one or more armored divisions, in addition to corps and army troops in the area served.

Breakdown of supplies within an armored division requires eighteen separate breakdowns, and normal attachments to the division increase this figure to twenty-two.

It is obvious that this number of breakdowns cannot be made by the railhead company. Only one breakdown is required to be made to an infantry division on its consolidated division requisition or request, because the infantry division contains a division quartermaster company. An armored division has no such organization to effect breakdown to the elements of the division of supplies received on consolidated requisitions. The division quartermaster section of an armored division is administrative, consisting of four officers and eleven enlisted men.

Rapid advance and large areas covered by an armored division in combat also preclude functioning of railhead distribution as prescribed.

In the search for a solution to this problem, the division set up a division control point under the command of the division quartermaster, provided with equipment and personnel sufficient to constitute a provisional breakdown section to draw and distribute all quartermaster supplies to all elements of the division and to attached units, and to handle salvage, post exchange issues, and personal effects.

This division control point was composed of the division quartermaster section supplemented by thirty to forty-five men from units within the division and an attached quartermaster truck company (two such truck companies were normally attached to each new type armored division at all times).

One platoon of the truck company was used to haul the consolidated rations which were brought from the Class I army dump to the division control point and there broken down to battalion and separate company supply trucks. This truck platoon was also used to carry an emergency supply of clothing, post exchange supplies, and comfort items carried by the Red Cross Field Directors for gratuitous issue.

The division was adequately supplied with rations at all times without requiring unit transportation to go back beyond the division control point during normal operations. The objective of keeping at least two rations (K, C, or ten-in-one) on hand in the unit and two under division control at the control point was maintained.

Motor fuel constitued the greatest supply problem, and two platoons from the attached truck company supplemented by battalion and separate company fuel and lubricant section trucks were used for gasoline resupply.

Unit trucks, both ration and fuel, went to the division control point for their requirements. Elements of a combat command were consolidated under the combat command S-4 for this purpose.

These trucks were supplied with rations

and picked up the mail at the control point, and were supplied with fuel to the extent that fuel was available. The remaining fuel trucks together with the empty quartermaster trucks returned immediately to the Class III dump for refill and return to the division control point under the supervision of the division quartermaster.

Here it must be noted that a system of priority on issue of gasoline had to be set up at times by G-4 and the division quartermaster depending upon the assigned mission of the various elements of the division.

This method of obtaining additional gasoline under division control gave the division a supply of 30,000 to 40,000 gallons over and above the basic load available at all times at the control point or en route thereto (trucks carry a 100 percent overload, giving a capacity of 1,250 gallons per truck).

During periods when there was no extensive movement, these times being the exception, the trucks could be used for many other purposes, such as hauling Class II property, salvage, and personal effects.

Many other functions were accomplished at the division control point. The Adjutant Generals Section operated an advance postal section and mail was delivered direct to the ration trucks.

A representative of the Chemical Warfare Section issued CWS property at the control point, and the division Provost Marshal established the division prisoner-of-war cage in the immediate vicinity of the control point so that empty trucks going to the rear for resupply could be utilized and carry prisoners to the corps prisoner-of-war enclosure usually located on the main supply road. It might be of interest to note that the normal load of prisoners in a 2½-ton 6x6 truck is at least fifty men.

The location of the control point is determined by the G-4, and the exact site selected by the division quartermaster after careful reconnaissance. It was as close to the forward elements as possible, with a road net that would permit access by the entire division. I recall one instance when the entire control point moved into a selected location on a captured airdrome just east of Nancy within sound of small-arms fire and within sight of advancing dismounted infantry.

There are obvious disadvantages to this system, which is entirely provisional. A quartermaster company should be organic in each armored division with at least the same strength as the quartermaster company in an infantry division. It is understood that in some infantry divisions, additional personnel over and above the T/O strength are used. Certainly some type of organization should be provided for quartermaster service in an armored division. The supply battalion of the old type armored division would provide a complete solution to the supply problem and eliminate the attachment of the two truck companies from higher headquarters. If this cannot be provided, there should be a quartermaster company organized similar to that of an infantry division, in addition to the attachment of two truck companies.

The system outlined is a solution to a serious supply deficiency. It provided supply of Class I, II, and III items daily and continually without failure from Normandy to Brittany and across France; a distance of some 900 miles covered by the division in a six-week period when army dumps and depots were at times as much as eighty to one hundred miles in rear of the using units.

Always mystify, mislead, and surprise the enemy if possible; and when you strike and overcome him, never give up the pursuit as long as your men have strength to follow; for an army routed, if hotly pursued, becomes panic-stricken and can then be destroyed by half their number.

—General Thomas J. (Stonewall) Jackson

The Japs' Non-Secret Weapon

CAPTAIN LAUREN K. SOTH, *Field Artillery*

THE battle for Okinawa did not add much to our knowledge of Jap tactics—but it did re-emphasize the Japs' strongest weapon—the tenacity of the individual soldier. Toward the end of the battle the newspapers carried stories about the "mass" surrender of Jap troops pinned in the southern end of the island. Actually, the numbers were very small compared with any other battle in modern times—*except* our other battles with the Japs. Intelligence officers found that a large percentage of those surrendering at the finish were not Japanese soldiers but were Koreans and Okinawans who had been impressed into labor battalions by their Jap overlords. Of an estimated 110,000 Jap troops (including these labor battalions, naval construction outfits, and other miscellaneous service elements), only 8,500 surrendered through the three-month campaign! This can hardly be called mass surrender.

When we landed on Okinawa on 1 April we were surprised to find that the Jap garrison had elected not to defend the beaches. Though they had high, commanding terrain, with caves and pillboxes evidently built to prevent a landing, these fortifications were mostly unoccupied. Our troops dashed in, took Yontan and Kadena airfields the first day, and swept on to cut the island in two the second day.

As Major General John R. Hodge, commanding the 24th Army Corps, said, "The Japs decided to hand us a beachhead on a platter. Why they didn't defend the beaches we'll probably never know. But we are grateful to them for letting us get a foothold."

The Japs did not counterattack in force to throw us off the island, either. Throughout the whole action they seldom counterattacked in more than company strength. At one time a coordinated counterattack was launched, with counterlandings, an artillery preparation, even a little air support—but only about a battalion of infantry!

Then why did it take us so long? Why couldn't we mop up quicker than ninety days after the assault? Okinawa is not a big island—only about sixty-five miles long—and the Japs defended only the southern third of it. It is not more than eleven miles wide at any point we fought over.

The reason it took so long is found in the first sentence of this article: the refusal of the individual Jap to give up, his stubbornness in fighting on when surrounded, his preference to die for the Emperor rather than to be taken captive.

That is the essential lesson to be learned by troops coming to this theater—it is a lesson taught time and time again in other Pacific battles. You have to grub each Jap out of his hole and kill him. It takes time but it is the only way.

Jap weapons are not extraordinary. They are not even in a class with most of ours. They have a good machine gun, an excellent 47-mm antitank gun, good mortars, and fairly good artillery weapons. But they do not have air support, nor naval support. In the Okinawan campaign, the Japs used more artillery than ever before in this war. At times it was extremely heavy. But it was mostly counterbattery, interdiction, and harassing fire. To go on, Jap tanks are no good, their explosives and fuzes often fail to function, and even their rifles are a sad article compared with our M1.

But most American soldiers know these things. The trouble is that those who have not fought in the Pacific war may reason from these facts that the Jap army is a pushover. It is not. Let me give you some examples from the Okinawan campaign of why the Jap is a tough enemy.

The Conical Hill position above Yonabaru was one of the keystones in the Jap defense line from Naha to Shuri to Yonabaru. The 96th Division hammered at this strongly fortified area for two weeks before it finally fell. Conical Hill is the dominating peak of a cluster of lower hills lying south of it. A hogback ridge extends directly south, cut up

with a few peaks, while to the southwest lie four hills which form an almost completely enclosed soup dish in the center.

Before storming the forward (northern) slopes, we pasted them with naval gunfire and artillery, then brought up tanks and M7 105-mm howitzers for direct fire on pillboxes and caves. The infantry got up to the top with little trouble. But when they tried to go over the top, they were met by heavy machine-gun fire. The Japs were defending the reverse slopes and the interior of the bowl. They had pillboxes and fortified caves lacing each hillside. Interlocking bands of machine-gun fire made it impossible to go over the top of Conical.

So one regiment attacked down the east side of the hogback ridge and secured all the eastern slopes. A battalion of another regiment took a hill on the right (west). So now the entire bowl was surrounded, except for a small gap on the south. The left regiment then swung around the end of the hogback to a position where it could cover this gap with fire.

The Japs inside were doomed. They could not get out. Yet for two long weeks they refused to surrender. Japanese interpreters called to them several times over loud speakers but the stubborn Nips answered by a fusillade of bullets each time, on one occasion killing a man operating the electrical equipment.

The 96th could not get tanks around to fire on the positions inside the bowl for most of the two-week period because of the heavy rains and mud like half-set concrete. Doughboys tried satchel charges, grenades, even pulled up 37-mm guns over the steep, muddy hills to fire down into the bowl. Still the Japs held on. Not one man surrendered voluntarily, although a few wounded were captured.

The situation around Conical was duplicated around Dick Hill, north of Shuri. Here other elements of the 96th and a regiment of the 77th Division fought the same kind of a rat-grubbing battle, with the Japs defending another soup bowl position which was nearly surrounded.

After the Naha-Yonabaru line was broken, Jap resistance broke up into numerous little pockets of a platoon or company. In nearly every case, each Jap had to be killed. One group held out far behind the lines for a week, causing a heavy toll of Americans, and resolved to die rather than give up. They eventually got their wish.

In the waning days of the campaign a company dug in on a ridgetop above Medeera was pestered by a sniper in a cluster of trees on the reverse slope below them. The company commander directed 60-mm mortar fire into the group of trees. He got a tree burst, almost certain to have killed anyone in the tree. But in a few minutes the sniper was back. This continued half the afternoon, with our mortars getting numerous direct hits and tree bursts.

Next day a patrol found five Jap bodies at the foot of the tree. Each Jap had crawled up to certain death, hoping to get at least one American before he died. No soldiers of any other country would do that. We think it is crazy and a poor use of manpower, even if you could get the men to do it. But that is the way the Japs fight.

In cases too numerous to mention, individual Japs or groups of two and three stayed in caves to be blown up, rather than come out and give up.

Officers who have been in Europe never fail to exclaim about this insistence on the part of the Japs that they be killed.

General Joseph W. Stilwell, new commander of the Tenth Army, put it succinctly when he visited out here during the heavy fighting: "This war is a lot tougher than the European War. You don't have to kill Germans one by one."

As I said at the beginning, these tactics of the Japs are not new—nor are they a new discovery for us. Okinawa merely points up the kind of fighting we face to lick Japan. We cannot over-emphasize the lesson.

Armored Spearhead in a Corps Breakthrough

THE northward sweep of the Pacific war has drawn the attention of military planners away from the concept of restricted maneuver imposed by island warfare. It is now conceded that landings on the larger land masses of Asia would open the door to the use of sizable mobile elements by both Allied and Japanese forces. Opportunities for armored flanking attacks, breakthrough operations, and swift pursuit, hitherto presented only in North Africa and Europe, may now await our forces.

Because of its possible applicability to the war against Japan, an account of a successful corps operation involving the use of armor in exploiting a breakthrough in the European fighting may be considered as instructive. Flying columns of armored divisions, following the better roads and the ridge lines, broke into the enemy's rear areas and disrupted his supply and communications. As expected, isolated groups of the enemy were bypassed in the swift advance. Mopping up was accomplished by the assignment of definite zones of responsibility to infantry divisions, which swept up the resistance left in the wake of the armor. This operation, controlled by corps, prevented the inefficient dispersion sometimes caused when spearhead troops are required to mop up.

Units assigned distant objectives were always allotted zones and mission-type orders. Coordination between swift-moving units on parallel routes was left to the division commanders concerned. Liaison planes were used by both corps and divisions to obtain and disseminate information, which tasks they performed with speed and skill. As long as these planes avoided wooded areas and guided on roads which had been cleared by the armor they were safe from all but scattered enemy fire. Full use was made of "report" lines to keep track of the positions of the tank columns. Information at corps headquarters regarding leading elements was usually two or three hours behind the action, which, in a fast-moving situation, was not considered an excessive lag.

Forward units were given information of elements to their flanks as rapidly as it was obtained from adjacent corps. Liaison officers and liaison planes provided the most successful means of transmitting this information. Armed guards ordinarily accompanied the liaison officers.

Tactical air support provided column cover, working directly with the armored divisions. Bomb lines were pushed ahead as rapidly as the need was indicated.

Certain observations made in the operation cited—examples which may help to prevent serious errors in the Far Eastern warfare—may be summed up as follows:

1. During exploitation, mopping-up procedures can best be coordinated by army, using troops assigned for that purpose. Corps control during rapid advances did not appear adequate to the performance of a thorough mop-up.

2. Care must be taken among staff sections to prevent administrative considerations from overbalancing tactical problems. Coordination of troop movements, allocation of reinforcing vehicles, and movement priorities are major issues in a breakthrough and pursuit.

3. Communications are continually stretched, but may be augmented by the assignment of additional liaison officers and the allocation of cub planes from artillery units. Since great reliance is placed on radio, strict compliance with signal security measures must be observed.

4. Sudden changes in the direction of the advance are to be expected. Commanders must be alert in order to foresee them. Orders are necessarily fragmentary and must be issued frequently. Coordination between units must be effected *on the ground* with minimum supervision by corps.

Aerial Reconnaissance

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RECONNAISSANCE aviation engages in collecting, recording, analyzing, and disseminating information for planning agencies and for air, ground, and naval forces in action.

Collection is accomplished by the human eye or the camera lens.

Recording is done in the human mind or on films.

Analyzing is done by photo interpreters, or G-2, or A-2.

Dissemination is accomplished by the most expeditious means available to all interested headquarters and units simultaneously.

Reconnaissance aviation is divided *operationally* into strategic and tactical reconnaissance. This division indicates type of information obtained.

Strategic reconnaissance penetrates deep into enemy territory and obtains information which is used in determining the sum total of the enemy's war effort and how we can best interfere with it.

Evaluation of this information gives an accurate index of the relative value of each of the enemy's factories, communications centers, industrial areas, etc., to his ability to wage war. Such evaluations point out the spots or industries where air attack may have the most disruptive immediate effect on his production—which means the most damaging effect in one to six months on his front-line battle power.

Strategic reconnaissance produces photos which are used in evaluating terrain and defense installations in areas which we expect to invade in six months or a year or more.

The south of France was invaded in the summer of 1944. It was completely photographed, from the Spanish border to the Italian, to a depth of 200 miles, in the summer of 1943.

In October 1944 the Japanese radio reported the presence of reconnaissance aircraft over Tokyo. The reports were correct, but this was not the first time, by more than a year, that the Japanese home islands had been photographed.

Tactical reconnaissance produces information for the use of tactical air forces and ground forces in battle.

Reconnaissance aviation units are divided *functionally* into Photographic and Tactical Reconnaissance Squadrons. This division indicates the means by which information is obtained.

It would be well at this point to clear up a similarity of terms which might otherwise be confusing.

Tactical reconnaissance gathers information primarily by eye. The pilots are carefully trained observers. They carry camera equipment which is used to supplement their observations, or to record for future study any object which the pilot is unable to identify.

Tactical reconnaissance gathers information for tactical air forces and for ground forces in combat. They are composed of both Photo Reconnaissance Squadrons and Tactical Reconnaissance Squadrons. Of these two, neither is perfect within itself. Each has its limitations, but when they are properly used, each to supplement the other, we can get a vast fund of information on all phases of the enemy's war effort.

Aerial reconnaissance (strategical and tactical) is accomplished by wings or groups made up of several different types of units. Let us classify them as information-gathering units and processing units.

The gathering units are:

- Photo Reconnaissance Squadrons
- Tactical Reconnaissance Squadrons
- Combat Mapping Squadrons
- Photo Mapping Squadrons
- VLR (Very Long-Range) Photo Squadrons
- Night Photo Squadrons
- Weather Reconnaissance Squadrons.

The processing units are:

- Photo Intelligence Detachments
- Photo Technical Units

Engineer Topographical Units (Aviation).

Photo Reconnaissance Squadrons penetrate deeply into enemy territory and take photos of small areas (two to twenty square miles). These areas may be widely separated one from the other, and the photo reconnaissance plane on one mission, a closed circuit of from 800 to 1,600 miles, may cover from ten to thirty such areas. The Photo Reconnaissance Squadron also has equipment for developing exposed film and making a limited number of prints from the negatives. It has a few interpreters who study pictures and prepare immediate reports.

Tactical Reconnaissance Squadrons cover the battlefront and enemy area to the rear of the front, usually to a depth of seventy-five miles or more. They specialize in finding targets of a transitory nature—columns of troops and armor, supply dumps, bridges, etc. Their aircraft are armed.

Combat Mapping Squadrons are equipped with fast, maneuverable aircraft, usually two-place, for pilot and navigator. They photograph large areas of enemy-held territory for use in making maps.

Photo Mapping Squadrons have multi-placed long-range aircraft capable of carrying many camera combinations. The 311th Wing, USAAF, is made up of Photo Mapping Squadrons and has been engaged since the start of the war in mapping air routes to the various theaters. Its squadrons are equipped with all aircraft from F-2's (C-45) to B-29's—they use the aircraft which best meets the demands of the specific job they are working on.

VLR Photo Squadrons are another example of choosing the best equipment for the specific job. They have been covering Japan since October 1944. They are equipped with B-29's. They gather their information by photographing the ground or by instrumental observation.

Night Photo Squadrons make photos using as a light source either bombs filled with photo-flash powder, or an electrical discharge flash system.

Weather Reconnaissance Squadrons gather information about the weather by visual observation and by instruments.

Photo Intelligence Detachments receive, record, and interpret photographic material produced by reconnaissance squadrons.

Photo Technical Units reproduce photographs in quantity. They are capable of preparing terrain models and mosaics. They may be augmented by special groups of personnel to perform photo interpretation and limited mapping.

Engineer Topographic Battalions or Companies (Aviation) operate with Photo Reconnaissance Units. They prepare, compile, and reproduce maps, charts, target charts, and mosaics. They plot, index, and store film, and are capable of producing prints and enlargements.

Other processing units making use of the products of reconnaissance aviation, but not themselves Air Force units, are army and corps engineer topographical organizations and photo interpreter teams.

The engineer topographical organizations make maps for ground forces from photos produced by reconnaissance aviation.

The photo interpreter teams do interpretation for ground force units.

In ground forces, photo interpretation is a G-2 function. In the air forces, it is a reconnaissance aviation function. So reconnaissance aviation furnishes information to air forces and photos to ground forces.

Photo reconnaissance concerns itself with the preparation and dissemination of detailed analyses of enemy installations. Its outstanding characteristic is its ability to subject such installations to day-by-day or week-by-week comparative analyses. Such analyses are prepared by photo interpreters who work under conditions which enable them to make extremely detailed studies of each item or unit in an enemy installation. A scarcely less outstanding characteristic is its ability to furnish the most rapid, comprehensive, and detailed terrain studies obtainable by any means. This is true whether the terrain under study be in friendly or enemy territory.

Photo reconnaissance has serious limitations which prevent its being a universal information service within itself. The greatest limitation to photo reconnaissance is the time interval between the briefing of the pilot and the delivery of information to the using unit. This time interval is a summation of the time required to fly the mission, process the film through the laboratory, and interpret the resulting photographs. In exceptional cases this time interval may be as short as three or four hours, but an overall average time is nearer eighteen to twenty-four hours.

A delay of a day or two makes no great difference in gathering information for planning an operation to take place next year —but that day or two delay could mean disaster to an infantry division in combat.

Other limiting factors to the use of photographic reconnaissance are weather, light, antiaircraft artillery, and enemy aircraft.

The weapon limitation is apparent; photographs cannot be taken through clouds or fog.

The light limitation has been overcome to some extent by development of the Night Photo Squadron.

Photographs taken by night produce useful information but the area covered is much smaller than that covered in daylight. The limitation of the light source used in night photos prohibits flying at altitudes much in excess of 6,000 feet. Even at this altitude the light is not strong enough to enable identification of other than large objects on the photographs. Another limitation in night photo reconnaissance is the fact that a plane at 6,000 to 10,000 feet is a comparatively profitable taregt for radar-directed antiaircraft artillery. Still another limitation is the difficulty of navigating to a pinpoint target under an overcast on a moonless night. Finding a target under such conditions is largely a matter of luck.

After the Ninth Air Force was well established in France, night photos were successfully obtained in October of 1944 when a Gee chain was set up near Reims. The pilots and navigators used a combination of Gee and ground control from a microwave-early-warning station. This combination, properly used, can bring an aircraft to within 200 yards of a target up to 150 miles distant. It worked well until, during the Ardennes breakthrough, a slave station of the Gee chain was destroyed by the Germans.

Despite these limitations, the tremendously detailed information which it gathers from large areas of enemy-held terrain makes photo reconnaissance the basic information-producing agency of the theater.

Tactical Reconnaissance Squadrons concern themselves with securing information about localized targets. Their most efficient operation is in the location of tragets of a transitory nature.

The time lag between shutter snap and dissemination of information in photo reconnaissance is the strong point of tactical reconnaissance. Such a time lag does not exist for visual observation.

It has frequently happened in this war that a tactical reconnaissance plane has located a column of tanks or troops in the enemy rear. Sometimes he has reported this target to fighter control center, which dispatched fighter-bombers on ground alert to hit the target. On occasions, fighter control vectored a fighter patrol to the target to destroy it. It has happened that the tactical reconnaissance pilot located a friendly fighter formation and led it to the target. In each of these instances it was a matter of minutes from the time the tactical reconnaissance pilot located the target until it was attacked by our own forces.

Tactical reconnaissance has its limitations too.

The limiting factor in the quantity of information secured by visual means is the fact that the information is gathered by that part of the pilot's mind which is not engaged in flying a high-performance single-place airplane.

The limiting factor in the quality of information secured by visual means is the difficulty of making accurate observations of targets while passing over or near them at a five-mile-a-minute speed.

The justifying factor which overcomes

these limitations is the speed with which information of localized or transitory targets may be relayed to friendly units capable of striking them before they cease to exist because of departure or deployment.

When tactical reconnaissance units employ the cameras with which their aircraft are equipped to supplement their visual observations, these limiting factors diminish. The detailed accuracy of their information increases, but the time required to process and disseminate that information also increases—and greatly.

I must point out that the type aircraft used by any aerial reconnaissance unit is incidental. Photo reconnaissance was not built around the P-38, nor was tactical reconnaissance built around the P-51. Now and later, the highest performance aircraft are and will be used—they are simply vehicles to transport the camera and the observer.

Reconnaissance planes must have the highest performance characteristics because while the bomber pilot may be said to have completed his mission when his bombs hit the target, and the fighter pilot his when he shoots down his enemy, the reconnaissance pilot has not completed his mission until he has landed and the information he has gathered is in the hands of all agencies which can use it.

I have indicated that both Photographic and Tactical Reconnaissance Squadrons have serious limitations—limitations which prevent either from being, in itself, a complete answer to our information needs. To achieve greatest efficiency in gathering information, these squadrons are used together, to supplement each other.

Chart 1 shows a theater organized with two reconnaissance wings, one of which serves the theater headquarters and the Strategic Air Force, the other the Tactical Air Force and the combat ground armies.

Each Tactical Air Command has operational control of a Reconnaissance Group made up of one Photo Reconnaissance Squadron and two Tactical Reconnaissance Squadrons.

The Reconnaissance Group on the extreme right of the diagram serves the Tactical Bomber Command and the Tactical Air Force. Elements of the Night Photo Reconnaissance Squadron are available to the Reconnaissance Group of the three Tactical Air Commands on call.

Thus each TAC (Tactical Air Command) and each army has access to balanced information-gathering units.

What does this Composite Group do?

For the Tactical Air Forces it produces:

1. Photographs and mosaics to use as target charts for air crews in the identification of their objectives.

2. Analyses of communications systems and determination of the choke points where the fewest bombs will do the greatest damage.

3. Information as to the strength, type, and disposition of opposing enemy air forces.

4. Visual information as to the location, extent, and nature of fleeting targets.

For the ground forces it produces:

1. Photographs for use as map supplements in

a. Briefing patrols.
b. Adjustment of artillery fire.
c. Detailing movements of our troops in assault.

2. Photographs from which ground force photo interpreters determine:

a. Location, nature, and extent of enemy forces, installations and lines of communications.
b. Detailed study of terrain in enemy hands.

3. Photographs from which engineer units prepare maps or revise existing maps.

For ground forces, too, it provides visual information on the location, number, and movement of enemy reserves, supplies, and artillery, and visual adjustment of long-range artillery fire.

Let us consider in more detail the information services furnished to ground force units by these Tactical Reconnaissance Groups.

Vertical and oblique photos are used in briefing and interrogating patrols, in detailing the movement of our troops forward, in assaults, and in adjusting artillery fire.

Organization of Reconnaissance Aviation in a Theater

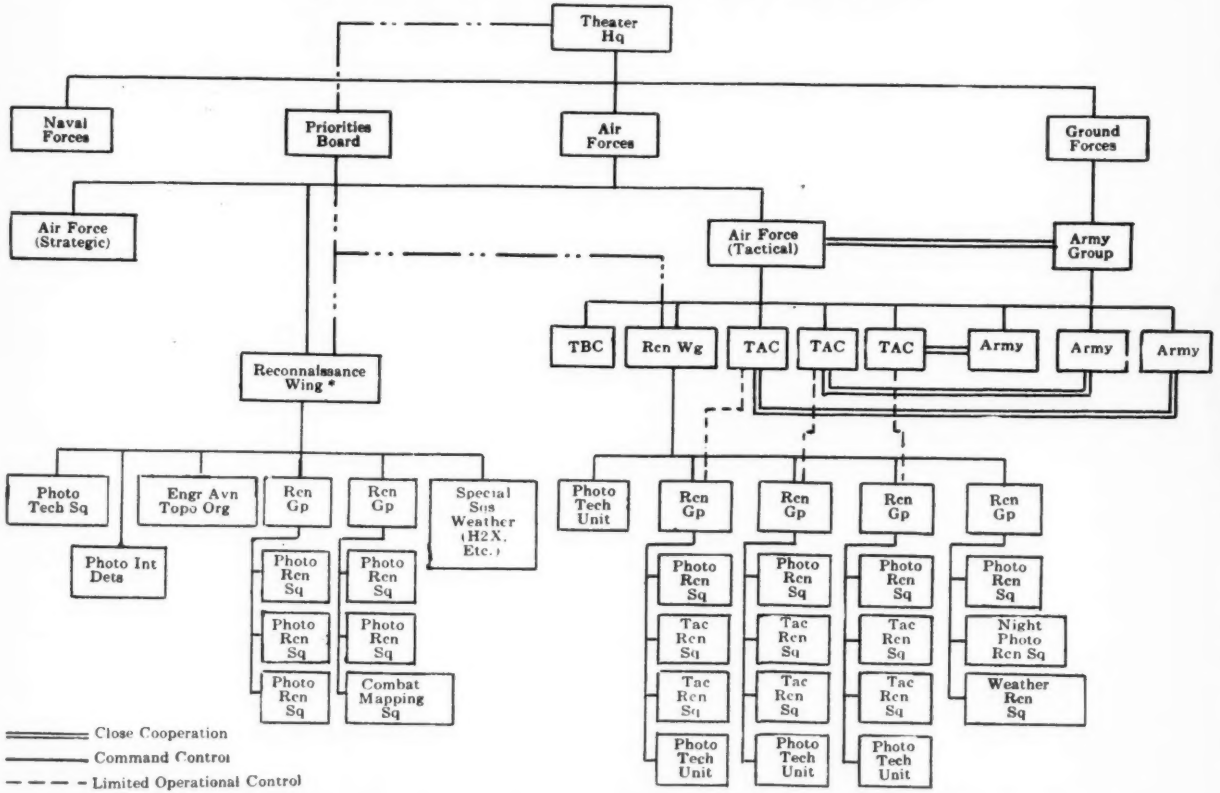


Chart 1

*May be under Air Force (Strategic)

Of these photos, the vertical are basic and the obliques are supplementary.

One of the first requirements of reconnaissance aviation is to photograph all the territory in the hands of the enemy army —every square foot of it. These pictures are called basic cover, and they are issued to armies in quantities sufficient to permit their distribution to platoons.

They carry a vast amount of detailed information about the terrain and they are used as map supplements.

In addition to basic cover, the entire area along the battle line, from the front to a depth of 15,000 to 20,000 yards, is photographed periodically. These periods vary from daily to weekly, depending on the activity along the front.

Photos from this repeated coverage seldom find their way into the hands of the fighting troops. They are studied by the photo interpreter teams for information on enemy mine fields, gun emplacements, and other such items. Information as to the location of these enemy emplacements is sent to the front-line troops who annotate the location on the basic cover which they already have.

When the interpreters locate an extensive strongpoint or fortified position on the periodic photos, or when units in contact with the enemy locate such a defense position, the reconnaissance unit produces extra-large scale photos of that position. From these photos the interpreters endeavor to determine the component weapons and their fields of fire. They determine the most profitable approaches (which are the least dangerous approaches) and forward this information to the combat troops whose job it will be to reduce the strongpoint. Photos furnished to assault troops for outlining defiladed routes of approach are usually verticals, but low-level obliques are sometimes furnished, particularly in rugged terrain. These obliques provide a good check on approach routes in unfamilar terrain because they include the skyline.

The basic cover furnished to field artillery for fire adjustment is usually gridded. The grids are arbitrary, and they provide accurate references to prominent topographic features but are utterly unreliable in providing any sort of references to map or geographic locations.

It is not unusual to find the basic cover in the hands of the artillery made up into gridded mosaics.

Artillery also gets obliques with the Merton grid superimposed. These obliques are used in conjunction with the vertical prints or mosaics *and* maps *or* survey data which the artillery has prepared, for quick designation and laying on of targets.

Usually artillery will have observers in a liaison plane, or in a forward position. These observers have obliques with the Merton grid. Their batteries have the same obliques and vertical photos and maps. Thus, both have the same reference material, making it easy for the observer to describe the location of a target and have his outfit know exactly where that target is.

Reconnaissance aviation provides certain visual information to ground troops. It furnishes information on the location, number, and movement of enemy reserves, supplies, and artillery up to seventy-five miles or deeper in the rear.

The tactical area is subdivided into areas or routes of a size that can be effectively searched by a single tactical reconnaissance mission of two tactical reconnaissance aircraft.

Routine area searches for each day are planned the night before at a conference between the TAC staff reconnaissance officer and army G-2. G-2 indicates the frequency of cover, the areas to be covered, and the time he wants the missions flown. The staff reconnaissance officer sees that the total requests are within the capabilities of his reconnaissance unit. The plan usually provides that one or more missions be held on ground alert for emergencies.

After the plan for the day is produced at the conference, it is forwarded to the Reconnaissance Group, where the group commander determines which squadrons will fly which areas.

Special or emergency requests from corps or division are transmitted through channels of the army G-2 Air Section to the staff reconnaissance officer of the cooperating TAC.

He passes the request on to the Reconnaissance Group where the desired information is either obtained on the next routine cover of the area in question or a special mission is sent out.

In the lower left corner of Chart 1 a Reconnaissance Wing (Strategic) is diagrammed. This wing is charged with gathering information for planning future operations in areas where a delay of a week or so makes no serious difference. It is also charged with collecting information on bomb damage and the status of deep targets for the Strategic Air Forces.

For these operations, where time delays produce no such evil consequences as they do for ground units in action, photographs are able to gather all the information required, so this wing has several photo squadrons and no tactical squadrons.

It has a Photo Tecnichal Squadron for print production and interpretation.

It has Photo Intelligence Detachments for interpretation.

It has an Engineer Aviation Topographic Organization for the production of maps, target charts, and terrain models.

It has two Reconnaissance Groups, totalling five Photo Reconnaissance Squadrons and one Combat Mapping Squadron.

The wing also has weather and other squadrons for use in special situations.

For such planning agencies as the Joint and Combined Chiefs of Staff; G-2, War Department General Staff; Office of Strategic Services; Theater Headquarters; and theater planners, this Strategic Wing supplies information about broad areas in the enemy rear. This information is used for

1. Determining priorities of areas of operations.

2. Search of large areas for potential targets.

3. Determining priority of targets by type and location in their areas.

4. Preparation of detailed communication, terrain, and defense studies of areas for future invasions.

For the Strategic Air Force it supplies day-to-day operational information consisting largely of target information and enemy order of battle information.

As a sample of the type work done for the Strategic Air Force, let us assume that the Air Force bombs an enemy steel mill. As soon as the smoke from the bombing clears away, usually the day after the raid, a reconnaissance plane photographs the mill. Photo interpreters who know steel mills as well as photo interpretation compare these pictures with pictures taken before the raid. They examine each building, and compare the damaged buildings with functional charts of the mill. Thus they can tell exactly which elements of the mill were damaged and how badly. They prepare an estimate of the amount of steel the mill is still capable of producing and an estimate as to how long it will take to complete repairs.

This report is forwarded to Air Force in two or three days—but Air Force does not hit the mill again immediately. That would not be economical warfare—if anything about war can be called economical. Instead of an immediate return of the bombers, the reconnaissance plane visits the mill weekly, and photo interpreters prepare new reports, detailing the repairs the enemy has made and the approximate time that the milll will be ready to go back into production.

It is only when the reconnaissance photos show that production is ready to start that Air Force bombs again. Thus we let the enemy expend as much as possible of his material and manpower resources for repairs before we kick his mill apart again. Such repeated bombing attacks—hit the target and let the enemy almost rebuild before we hit again—are much more destructive to his war-making potential than a single overwhelming attack where we flatten the mill beyond hope of repair on our first trip over his lines.

You have gathered some idea of the complexity of reconnaissance aviation—of the many technical skills closely integrated and working to one end—the production of as much information about the enemy as possible as quickly as possible. You can conceive how easily the functioning of such an organization may be upset if it is not properly directed.

In conformity with classical military organization, the Reconnaissance Aviation Wing or Group is controlled by the commanding general of the air force or air command to which the reconnaissance unit is assigned. He has in his special staff a reconnaissance officer, whose duty is to advise the commanding general on the employment of his reconnaissance aviation in much the same way as the staff engineer officer advises in the employment of engineer units.

It sometimes becomes the duty of the staff reconnaissance officer to reject some requests for reconnaissance, and, in conference with the requesting agency, to modify other requests. Out of his experience and his knowledge of the capabilities of the reconnaissance unit available, he prepares and keeps up to date an operating procedure which most nearly fills the needs of all headquarters requesting information.

In cases where one Reconnaissance Wing does work for all forces in a theater, no one man could be expected to sift and evaluate all requests for reconnaissance which pour in.

Such a case is illustrated on Chart 2.

In a theater so organized, Navy would be calling for daily reports on as many as a hundred ports and shipyards, and for detailed statements as to the status of every ship and ship-repair facility in each.

Ground forces request photographs of every square foot of ground from the enemy front lines to a depth of 200 miles or more—for the location of every gun, machine gun, and pillbox in the tactical area, for a daily report of all changes, and for prints in sufficient quantity to distribute one each to every squad plus a ten-percent surplus for emergencies.

Air Forces request daily statements as to the location and status of every marshalling yard, factory, communications center, and every other actual or potential target within range of their aircraft, plus a statement as to location and condition of every enemy aircraft.

Those theater headquarters staffs who are planning our next invasion require detailed assessments of beaches and adjacent territory to include the location and nature not only of defense positions but also of any military or civil facility which might assist the enemy to repel our assault, or assist our forces to exploit their landing.

These examples are not exaggerated. Identical requirements have been presented to Reconnaissance Wings repeatedly during the war. In some cases the theater headquarters sets up a Theater Reconnaissance Priorities Board. The board is composed of Army, Navy and Air officers who are in close contact with planning and operations in the theater. This board weighs each request for reconnaissance and assigns it a priority in keeping with that request's relative importance to the theater's requirements as a whole, and with the production capacity of the Reconnaissance Wing.

When a Reconnaissance Group is working directly for a Tactical Air Command, as illustrated on the lower right corner of Charts 1 and 2, the needs of that Tactical Air Command and of the army with which that TAC is cooperating do not go through the Priorities Board. The staff reconnaissance officer of the TAC acts in the same capacity as the Priorities Board in coordinating the requests from A-2 of the TAC and G-2 of the army.

A group working directly for a TAC as illustrated here may, in addition to TAC and army's needs, have certain work assigned it by the Theater Priorities Board.

The foregoing is a very general assessment of reconnaissance aviation. It is neither advisable nor possible to prepare a rigid estimate of its limitations or capabilities. Constant experiment and improvements in techniques are reducing present limitations.

Organization of Reconnaissance Aviation in a Theater

Chart 2

Despite the progress made during the years 1942-45, there still remain experimental procedures which have not yet been tested under combat conditions.

Important points for all users of aerial reconnaissance products are:

1. Each individual unit has limitations.

2. Wings and groups made up of different type units are able to fulfil a variety of functions by employing the unit most capable of meeting each specific request.

3. G-2 or A-2 of any unit will get best results from reconnaissance units by exercising his liaison privileges in discussing his specific needs wth the proper staff reconnaissance officer.

Luftwaffe Finale

Digested at the Command and General Staff School from an article in *The Aeroplane* (Great Britain) 6 April 1945.

FIVE and a half years of war saw the degeneration of the Luftwaffe from one of the world's mightiest air forces to a group of disorganized components totally unable to fulfil tactical and strategic needs. The struggle for air supremacy between Germany and the Allies was, for the first two years or so of the war, fairly indecisive, but with the addition of Russia and the United States, superiority in the air was slowly attained by the Allies.

The tremendous heavy-bomber forces which were then gradually built up in England concentrated mainly on German industrial targets, while Allied fighter aircraft ranged over the Continent challenging the Luftwaffe to battle. The attacks against enemy aircraft production and assembly plants increased in intensity, and these factors, combined with the heavy losses inflicted by the U.S. heavy bombers in daylight, steadily liquidated the German fighter forces and their reserves. A far from negligible portion of the Luftwaffe was destroyed, both in the air and on the ground, in North Africa.

With Germany's fighter forces substantially reduced, the offensive was next switched to oil targets. A large proportion of the Rumanian oil wells, which formed one of the enemy's main sources of supply, were destroyed or damaged, while refineries and oil storage depots were continually attacked. The resultant fuel shortage affected both the Wehrmacht and the Luftwaffe, and caused the grounding of virtually all aircraft except defensive fighters. Even on the most urgent occasions these fighters were often quite unable to operate.

During 1944, however, a slight resuscitation of fighter production was effected. In addition to the Messerschmitt Me 109 and Focke-Wulf FW 190 types, reaction-propelled fighters were introduced into the production lines, and the total quantity exceeded 1,000 per month. This increase was largely brought about by the "jet" aircraft, which, having no complicated internal-combustion motors and constant-speed airscrews, took considerably less time to construct. Another advantage from the German point of view was that the use of lower grade fuels of varying character became possible.

The superior performance of the reaction-propelled types was nullified to some extent by the poor training of the air crews, many of whom had been transferred from bomber units and were unused to such speed and fighter tactics. As the invading Allies moved into the Reich, fighters were withdrawn from other fronts in an attempt to re-establish, if not supremacy, at least equality in the air, to support the land forces. Assistance in this respect was gained from the shortened lines of communications obtained through loss of territory.

The futility of this effort is by now history. Although technically equal or perhaps even superior to their Allied contemporaries, the Luftwaffe fighters were neither numerous enough nor flown well enough to cause any diversion of effort.

Maintenance of Spare Parts

Released by the Director, Maintenance Division, Army Service Forces.

THE equipment maintenance program that functions automatically has yet to be invented. A staff officer can not establish a program, then forget about it and expect it to bring many worthwhile results, because the conditions that made it necessary in the first place—laxity, ignorance, poor supervision—will be constantly at work to destroy it.

To overcome these conditions, commanding officers must take corrective action on all maintenance weaknesses that show up in their units. This requires their constant attention in order to cope with new problems that appear and with those which change from minor to major importance because of factors of time, distance, climate, and other variables.

An example of the latter situation is very much in evidence at the present time. The Army's aging equipment, under long hours of heavy, uninterrupted operation, and greatly increased demands for additional equipment have placed a terrific strain on spare parts supply lines. The only answer to the problem is to cut down on spare parts requirements. This must be accomplished in large part by unit action in increasing and improving preventive maintenance activities to the point where equipment failures and the resulting demands for spare parts are kept to a minimum.

As in all maintenance activities, the officer's responsibility here is to make sure that his men know what is expected of them, that the expectations are reasonable, and, finally, that they are properly carried out. He must take it upon himself to see that information concerning the problem at hand is readily available to the men and is presented in an intelligible manner, and he must know enough about the subject himself to make his inspections thorough and accurate and to make his comments and criticisms carry weight.

Though maintenance improvement is fundamental to the solution of the present problem of spare parts supply, there are a number of other factors to be considered. One of the most important of these is the "hoarding" of spare parts by unit supply personnel. This creates false shortages.

Behind this practice lies the real trouble—failure of requisitions to bring the prompt action necessary to keep unit supplies at proper levels, with the resulting fear that needs will not be met. Frequently, this is due to improper or incomplete execution of requisitions. A high percentage of the items listed on requisitions received by depots are improperly identified. Now, this condition is easily remedied when instructions to personnel who fill out requisitions are clearly given and faithfully followed. The officer can get quick results on this score by seeing that his men observe a few basic requirements when making out requisitions.

In order to obtain a complete understanding of the procedure, officers will do well to familiarize themselves with the equipment catalog system and the publications which deal with requisitioning. The present system of cataloging the Army's equipment is made as simple as possible by standardizing the catalogs for all technical services. This has been accomplished by issuing them in a series of sections bearing the title, "Army Service Forces Catalog," with the abbreviation CW, ENG, MED, ORD, QM, SIG, or TC to identify a catalog as one concerning a particular technical service. A complete outline of this catalog setup is given in Circular 304, War Department, 17 July 1944.

Other publications giving information on the requisitioning system are TM 38-220, Stock Control Manual for Posts, Camps, and Stations, 9 May 1944, and TM 37-250, Basic Maintenance Manual, November 1944. Two indexes needed to keep complete, up-to-date files of maintenance publications involving use of spare parts are FM 21-6, which lists technical manuals, technical bulletins, and War Department Lubrication Orders, and War Department Pamphlet No. 12-6, which

lists, among other things, supply bulletins, modification work orders, and forms and records concerned with maintenance.

An extremely important point, of interest to officers, concerns the availability of catalogs, technical bulletins, and other publications connected with spare parts requisitioning and maintenance. Although each War Department publication is distributed automatically according to predetermined lists, *any unit, whether it is on the distribution list or not, may requisition any publication it needs.*

Another phase of spare parts maintenance which affects the supply and which therefore requires attention from staff officers is the tendency on the part of mechanics to turn in spare parts for salvage when they are still in good enough condition to be repaired and put back into service. For this reason, parts removed from equipment should be carefully inspected before they are turned in for salvage, and some means of carrying out these inspections regularly should be instituted in every unit. Still another point to be remembered is the fact that keeping spare parts properly identified and carefully protected against damage while on the supply shelves and in the supply bins can do much to "stretch" spare parts supplies.

There is one statement which sums up the whole situation very neatly. It should serve as a slogan-reminder for all maintenance personnel: Maintenance breaks down for lack of spare parts—spare parts break down for lack of maintenance.

Pipeline to China

From *Quartermaster Training Service Journal* 6 July 1945.

THE longest pipeline in the world is almost complete. Built by Army Engineers and Chinese and Indian workers, it now carries fuel from Calcutta across the Brahmaputra valley to Assam, through the Patkai Mountains into Burma, and finally climbs the hump of the Himalayas into China.

The first section of the line (to Northern Burma) was constructed last year and helped in reopening the Stilwell Road. Then last May came the announcement that the line had been extended more than 400 additional miles. The extension is one reward of the Salween campaign, big offensive of Chinese forces.

The four-inch pipeline can pump 80-octane behind 100-octane gasoline and can throw in some diesel oil when needed. It represents a vital logistical development for China, when previously fuel was so precious that many vehicles operated on a mixture of twenty-five percent gasoline and seventy-five percent home-made alcohol.

During construction, pipe was flown over the hump by Air Transport Command planes. Trucks or Chinese workmen carried it to the engineers (from Engineer Petroleum Distribution Companies) who had been spotted along the way, leapfrog fashion, so that they could work on sections from either end. Pipe was coupled together with special clamps. In certain areas, it was welded.

Pumping stations, set up along the line, can spot leaks or trouble. Guards walk the line daily.

Nature's obstacles made construction difficult. At one point the line runs through a 9,000-foot mountain pass; it also goes through narrow gorges and rocky canyons. Weather conditions ranged from freezing to monsoons. Tigers and elephants were encountered. One report from Northern India read: "Night before last at Station 22, a tiger tore down screen door in kitchen and consumed all suet and other non-canned food. Responsibility of operating pipeline in Assam beginning to assume angles not taught in Pipeline School."

MILITARY NOTES AROUND THE WORLD

JAPAN

Japanese Paratroops:

Paratroop operations by the Japanese have not been numerous. Early in the war Menado in the Celebes, Palembang, Sumatra, and Koepang were all scenes of airborne attack. Successful operations against Timor set the scene for one of the most heroic Allied stories of those months, the saga of the Guerrillas of Timor. By these early and generally profitable experiments the Japanese might have been encouraged to try more and greater paratroop operations in New Guinea. But it was not until late November 1944 that another sizable operation was attempted. That attack was planned as part of a counteroffensive to neutralize Morotai. In the midst of planning, it was shifted to support a convoy scheduled to enter Ormoc Bay on 28 November. The plan fizzled.

A more elaborate airborne attack was scheduled for 5-6 December, designed to assist another convoy to unload at Ormoc 7 December. Attack by Japanese ground forces was to be synchronized with the jump, but the timing failed. So did the operation as a whole.

Despite these setbacks, Japanese plans for airborne organization are ambitious. Besides regular paratroops and airborne infantry, it is believed the Japs have set up parachute artillery, glider artillery, machine cannon, tank, engineer, signals, transport, and evacuation units—all airborne. Between 1941 and 1944, many Japanese were trained in German parachute schools.

(*Air Force*)

Japanese Floatplanes:

Whereas Allied types of float seaplanes are few in number, the Japanese, lacking any great wealth of carriers, have a variety of reconnaissance floatplanes, such as the old "Jake" (Figure 1), which is being supplanted by "Paul" (Figure 2) and the newer "Norm." "Jake" and "Paul" have twin floats and are low-wing monoplanes, but the newer and faster "Norm"—like the majority of the

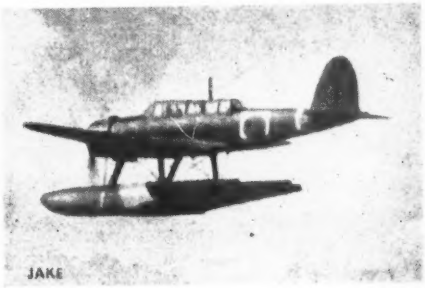


FIGURE 1.

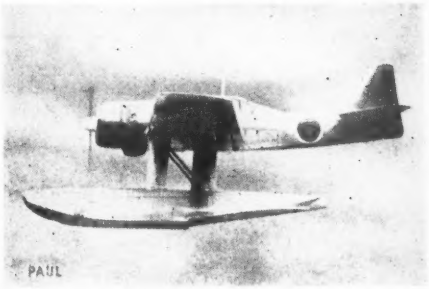


FIGURE 2.

later Japanese seaplanes—has one central float and a mid-wing.

Unlike the Allies, Japan still finds it necessary to have fighter seaplanes such as "Rufe" (Figure 3), the well-known adaptation of the landplane fighter "Zeke," and the newer "Rex" which is replacing "Rufe." Both "Rufe" and "Rex" have single floats, "Rex" being the seaplane version of "George."

FIGURE 3.

Japan also has submarine-borne floatplanes in small numbers. These are built in such a way that they can be assembled or taken apart rapidly and are usually stowed in "hangars" on the decks of the submarines.

(*Aircraft Recognition*, Great Britian)

Rocket Suicide Bombs:

In the Okinawa campaign the Japanese made use of rocket-propelled suicide bombs against American forces. These weapons, which are similar to a small, single-seat airplane, carry a pilot and are generally launched from the underside of the fuselage of a bomber. They have a wingspan of about sixteen feet, a length of more than nineteen feet, and a tail plane of about eight feet. Constructed of light metals and wood, these bombs carry a heavy warhead of explosives. They are capable of high speed which reduces their manueverability to a low point.

United States forces have designated these missiles by the term "baka bomb." "Baka" is Japanese meaning "stupid," "foolish," or "silly."

(*Army and Navy Journal*)

U. S. S. R.

Feeding the Red Army:

At the beginning of the war, every front [Russian army group] set up its own auxiliary food base with special farms. This allowed for a sharp reduction of transports of food and fodder from the deep rear. The released transport was able to deliver additional ammunition, fuel, medicines, and other materials to the Army.

After the counteroffensive began and Soviet Armies moved west, the auxiliary farms with their equipment were turned over to state farms or local authorities. Two thousand large Army farms were transferred to civilian organizations by troops advancing westward. Besides the farms, the Red Army left many restored flour mills, dairies, sugar mills, and other food factories. These farms, in turn, supplied the Red Army with provisions as long as they were in the front zone.

The Red Army also solved another difficult problem. The soldiers built some 120 large vegetable storehouses for millions of tons of potatoes and other vegetables in record-breaking time. As a result, there are no diseases due to lack of vitamins.

Finally, the Red Army food supply organs solved the problem of preparing appetizing food for officers and men. During the war, hundreds of thousands of women volunteered as cooks, were graduated from special courses, and became Army cooks. The women introduced into their profession their housewifely skill, providing a great variety in meals.

(*Information Bulletin*,
Washington Embassy of USSR)

Soviet Heavy Artillery:

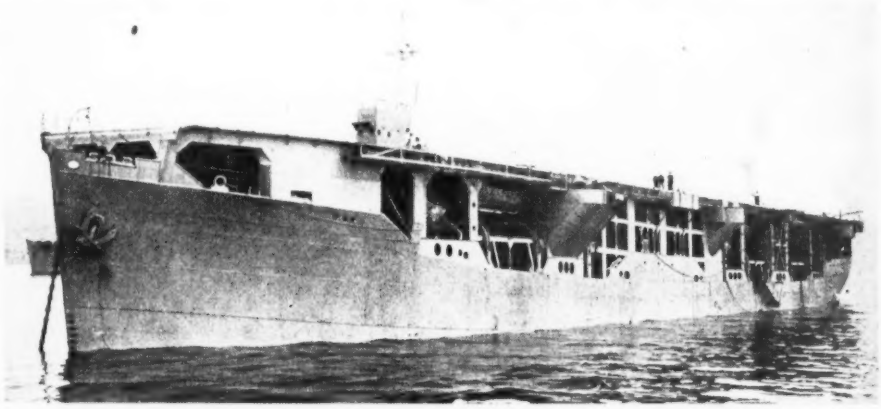
American observers in Moscow witnessed some of the world's heaviest artillery, including huge, two-section, tractor-drawn howitzers and mortars which appeared to exceed even the long-secret 360-mm pieces the Soviet armies are said to possess. These howitzers easily are larger than the German "Satan," and surpass the Russians' giant siege guns and rifles.

(*Marine Corps Gazette*)

GREAT BRITAIN

Merchant Aircraft-Carriers:

Britain's merchant aircraft-carriers, one of which appears in the picture below, are of a type unique in naval history in that they combine the functions of laden merchantmen with those of miniature escort carriers. The original purpose of these ships was to provide air cover both for themselves and for other vessels in the 500-mile air gap in the Atlantic which was at that time outside the range of shore-based aircraft.



MAC ships (merchant aircraft-carriers) are under the command of Merchant Masters and carry flying personnel of the Fleet Air Arm. They were brought into use as an emergency measure at a time when all the available escort carriers were required for major naval operations. The MAC ships were a development of the earlier CAM ships, or Catapult Armed Merchantmen. In the case of CAM ships, the aircraft, once having taken off, could not return, the pilots baling out in the vicinity of the convoy and being picked up by an escort vessel. The MAC ships overcame this very great disadvantage, with its attendant 100 percent loss in aircraft, by having flight decks superimposed on the vessels. This was no easy task. Structural alterations raised many problems. Cargo appliances, such as masts, derricks, and winches, and large hatchway openings were impracticable to fit. Under these conditions the ships are confined to graintype cargoes, which can be discharged by suction and loaded by chute.

The naval pilots operating from MAC ships have to face many difficulties in taking off and landing on what has been described as "a postage stamp." Even the largest MAC ship is considerably smaller than the smallest of aircraft-carriers. In one case, pilots have a flat space of only about 400 feet from which to take off and on which to land. Considering the alarming deck movement frequently encountered in the Atlantic, this is no small feat.

(*The Sphere*, Great Britain)

Total V-2 Casualties:

The total number of V-2 rockets officially reported to have landed in England was 1,048. The highest number of incidents in any twenty-four hour period was seventeen. Casualties totaled 9,277, of which 2,754 were fatal.

(British Information Services)

The Smoke Screen on the Rhine:

The great Allied assault across the Rhine into the northern German plain was launched from behind the longest and thickest smoke screen of the war, which for weeks had

masked Montgomery's large-scale preparations along the west bank of the Rhine. Beginning, at its northern end, on the river Waal, near Nijmegen, the smoke cloud was kept rolling along the sixty-six mile stretch right down the Rhine to Duisburg.

Mainly operated by troops of the Pioneer Corps, the screen was produced by mobile mechanical generators and fuzed hand canisters. Working day after day, week after week, the troops started up the smoke cloud an hour before first light in the morning and kept it going until an hour after dusk. Their task has been described as one of the longest steady shifts of any branch of the Services. It hid preparations of such magnitude that when the assault was finally launched across the river it overwhelmed the enemy on the far bank.

BRITISH TROOPS LAYING PART OF THE VAST SMOKE SCREEN WHICH MASKED PREPARATIONS FOR THE "FINAL HEAVE."

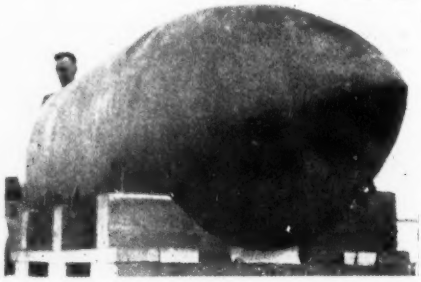
(*The Illustrated London News*)

New British Planes:

Britain has four new airplanes in production for the Japanese war that are faster than any warplanes yet produced. The jet-propelled Vampire, with a speed of more than 500 miles per hour in level flight, is a single-seat fighter designed and built by the makers of the Mosquito. The Hornet, officially described as a scaled-down version of the Mosquito, becomes the fastest propellered warplane in the world with a top speed of more than 470 miles per hour. The Spiteful, offspring of the spitfire, is a single-seat fighter with streamlined fuselage and wings and a top speed of 460 miles per hour. The Lincoln, a mighty new four-engined bomber, is bigger than its predecessor, the Lancaster, can carry a heavier bomb-load, and has greater speed and range.

(From a British source)

"Ten-Ton Tessie":



The warhead of the RAF's 22,000-pound bomb loaded on a lorry specially built to carry such loads. The vehicle is driven by a 90-horsepower direct-injection compression-ignition engine. Armorers fit the tails of these mighty bombs just before bombing-up.

(*Flight*, Great Britain)

INDIA

Indian Parachute Regiment:

The King has approved the creation of an Indian Parachute Regiment. This distinction marks a notable addition to the proud scroll of regiments of the Indian Army.

Indian parachute units, whose vital role in modern warfare is today fully recognized and who have already fought valiantly in an infantry role to defend India's eastern frontiers at the bloody battle of the Sangshak Plateau, will be absorbed into the new formation.

India has not been behind other nations in training and using these "soldiers of the skies." The nucleus of the first parachute training battalion was formed three and a half years ago.

Together with a battalion of the Fifth Mahratta Light Infantry, two companies of State forces, and British and Indian gunners, men of an Indian parachute formation for six days denied the plain of Imphal to the oncoming Japs and thus won a valuable respite in which the relieving Fifth Indian Division could be flown in from Imphal.

Special pay for Indian parachute troops has just been announced in an Indian Army Order.

(*Indian Information*)

BRAZIL

First Brazilian Aerial Combat Squadron:

The 1st Brazilian Aerial Combat Squadron arrived in Italy on 6 October 1944. It was the first unit of the Brazilian Air Force to engage in combat activities. The squadron embarked in the Port of New York, going to Liorna and beginning activities almost immediately. It received its first combat experience flying its Thunderbolt planes alongside the fliers of the Twelfth Air Force. On 11 November it accomplished its first mission as an independent unit.

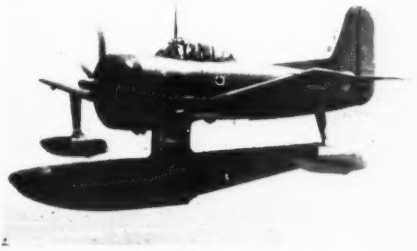
From 31 October to 22 January the squadron made 897 raids, dropping 339 tons of bombs. During this time it destroyed on the ground one enemy bomber, 159 trucks and armored vehicles, one locomotive, thirty-three railway cars, six bridges, three fuel dumps, two ammunition dumps, and one supply dump. Its bombs cut highly important railway lines in ninety-four places and blew up or set fire to nine buildings occupied by the enemy. Also, the squadron severely damaged one enemy bomber on the ground, 105 trucks and armored vehicles, thirty-six locomotives, 306 railway cars, seven bridges, five ships, and various small boats.

(*El Observador Militar Interamericano*)

UNITED STATES

New Scout Seaplane, the Seahawk:

Twice as fast as the venerable Kingfisher, veteran Navy cruiser- and battleship-based scout seaplane, with three times the horsepower in her mighty radial engine, the new



Navy SC-1 Seahawk, built by Curtiss-Wright, has become a part of the fighting fleet. This fast, single-place scout-observation floatplane is catapulted off cruisers and battleships to

spot for the ship's gunfire, to search out enemy fleet units, and to act as a rescue plane when necessary. It can attack or defend itself while reporting enemy disposition or calling the shots for the big guns of its ship. Folding wings are a new feature for a Navy scout-observation seaplane.

(*Official U. S. Navy photos*)

The Tigercat:

The U. S. Navy's new F7F Tigercat, the most powerful fighter and fighter-bomber in action today, is a blood brother of other famous Grumman Aircraft Engineering Corporation products like the F4F Wildcat, the TBF Avenger, and the F6F Hellcat. The Tigercat is a big plane, half as heavy again

as the Hellcat with more than twice its horsepower. This tremendous horsepower combined with Grumman design has produced the Navy's fastest-climbing plane.

The new plane is faster at sea level than anything the Japs have. At its critical altitude the F7F is in the 425-mile-per-hour class, and for short emergency periods the Tigercat's rated horsepower may be surpassed considerably.

(*Official U. S. Navy photo*)

Lightweight Bazooka:

General Electric Company has developed a lightweight bazooka, forty-two percent lighter than the standard model, with a new "eye" sight, and capable of handling as easily as an M-1 rifle. The new rocket launcher is more accurate than the original, weighs but ten and a half pounds, and is made of aluminum, very thick, instead of steel. An optical sight on a folding mound permits unrestricted vision when leading fast-moving vehicles such as tanks. Dry cell batteries have been replaced with impulse generators on the launcher.

(*Marine Corps Gazette*)

UNITED NATIONS

Ships on Loan to Russia:

Fourteen naval fighting craft that were turned over to the Soviet Union last year took the place of an equivalent number of units of the Italian Fleet which Russia had requested. The ships are on loan. Final disposition of the Italian Fleet will not be determined until the peace conference.

Except for the United States cruiser (the *Milwaukee*), all the naval vessels involved in the transfer to the Red Fleet were British. They were the 35,500-ton battleship *Royal Sovereign*, eight over-age destroyers that Britian got from the United States early in the war, and four modern submarines. The *Milwaukee* has been renamed the *Murmansk*, and the *Royal Sovereign* the *Archangelsk*.

In addition to the naval units, Russia also received 40,000 tons of merchant shipping, 20,000 tons each from Britain and the United States, to satisfy her claim for that volume of Italian merchant tonnage.

Russia made her claims for part of the Italian Fleet immediately after the fleet had surrendered, and it was agreed at Teheran that Russia was to have a battleship, a cruiser, and other vessels from the Italian Navy.

The British Government later pointed out to Russia that the Italian ships were built to sail in the temperate waters of the Mediterranean and were unsuited for the northern seas, and also that units of the Italian Fleet were rendering valuable service in fighting the Germans. It was then that the agreement to lend Allied warships to the Red Fleet was reached, and the Russians expressed complete satisfaction.

(From news reports)

Allied Strength in Europe:

The Allied ground strength under General Eisenhower included sixty American divisions comprising three airborne, fifteen armored, and forty-two infantry divisions. There was a total of fourteen British divisions, five Canadian, eleven French, and one Polish.

(*Army and Navy Journal*)

FOREIGN MILITARY DIGESTS

How the Japs Train Snipers

An article in *Aim*, army magazine of the British Middle East Command, No. 38, March 1945.

IN the early months of the war against the Japanese, there was a tendency to exaggerate the ability of their snipers. Then, after a time, it became evident that, when they were used against a well-prepared opposition, they were more of a nuisance factor than anything else. Recently the Americans captured a Japanese sniper-training program, and from it we can get a clearer picture of this opponent and size him up accordingly.

Candidates for sniper training are selected, without an examination of any kind, by the respective platoon leaders of each company. However, it is customary to select only those men who have superior marksmanship records. The men do not consider it a special honor to be selected to attend sniper training classes; instead, the work is looked upon as just another phase of the training program.

Short men are preferred to tall men. The Japanese reason that small men present less conspicuous targets to hostile fire. The wearing of glasses does not necessarily disqualify a soldier from becoming a sniper. When troops are distributed over a wide area, each battalion trains its own snipers.

The snipers use either the 6.5-mm rifle, Model 97, or the 6.5-mm rifle, Model 38. The former is regarded as distinctly superior. In addition, the snipers are supplied with a telescopic sight, Model 97. After receiving his rifle, a marksman determines its individual characteristics by firing it from a fixed mount.

Four Main Tasks

Japanese snipers are taught that their missions, in order of importance, will be: (1) to kill or capture hostile personnel—especially unit leaders and snipers; (2) to neutralize or destroy hostile installations which may obstruct the successful completion of a Japanese unit's mission; (3) to destroy the enemy heavy weapons and the personnel manning them; and (4) to deal effectively with all targets of opportunity which may come within range.

As a rule, an officer personally supervises each sniper's firing. For firing at targets at ranges of 300 yards or more, telescopic sights are sometimes used. When soldiers fire rifles without the aid of these sights, they are instructed to aim without closing either eye.

The men are taught to estimate ranges with the naked eye. The instructors place objects at measured distances, varying from 200 to 600 yards, and the men then estimate their ranges. Excellent eyesight and continual practice are necessary for accurate estimation. The men are *not* required to judge the distance of objects over water.

For firing at targets above the horizontal, Jap snipers are taught to decrease the range. For example, if the range is estimated to be 600 yards, the sights are set for 500 yards. The procedure is reversed when the men are firing at targets below the horizontal. The exact reason for this method is not known.

Camouflage Training

According to a prisoner, every light machine-gun squad has a sniper; however, not all snipers are equipped with the Model 97 rifle and the Model 97 telescopic sight. In one company of a representative infantry regiment there are only three Model 97's.

As you might expect, a thorough course in individual camouflage is given. Men are taught that camouflage of the upper half of the body is especially important. Helmet nets and body nets are issued to all men for camouflage purposes. For additional camouflage, the nets are garnished with foliage. A prisoner remarked that although all men strictly observe such measures during training, they do not actually carry them out during combat, especially in the jungle. The nets become entangled with the various shrubs and vines, and hinder movement.

Often, instead of using nets, the men cut small branches and twigs and stick these into their pockets and buttonholes. Another prisoner told us that his particular unit had never heard of the use of camouflage suits, straw hoods, or fiber capes. In localities where the background is not green, appropriate camouflage measures are taken, such as using dry branches and leaves and dry bark to blend with the color of the background.

Defensive tactics seem to be neglected in training. When encountering a superior hostile force, the sniper and the rest of the squad are told to fire their rifles rapidly, with or without taking aim, in order to warn Japanese troops to the rear. The squad then fights a delaying action as best it can, while withdrawing by a roundabout route to avoid disclosing the dispositions of these troops.

When a hostile attack is suddenly made on a flank, the snipers are held responsible for handling the emergency until a Japanese force arrives to deal with it.

If tanks come within close range, the sniper is told to aim at the vision slits or any other opening.

Since it is always hoped that captured Allied soldiers will prove a source of military information, snipers are ordered to take prisoners whenever possible. No definite instructions are given as to the methods which are to be employed when prisoners are captured.

Under such circumstances the sniper's job is to fire on the hostile section leader and on men with automatic weapons—in accordance with the Japanese principle of eliminating leaders in the hope of demoralizing their men. In trying to identify the leader of a hostile patrol, the Japanese look for a man carrying a pistol or one who seems to be issuing instructions.

One of the sniper's duties is the spotting of hostile snipers. Allied soldiers are believed to be "snipers" if they are found trying to locate Japanese light machine-gun positions or gunners.

When fighting in open terrain, a Jap sniper usually fires at a range of 500 yards. There is no established range for firing in the jungle, since trees and other vegetation are so likely to obscure the sniper's vision.

As a precautionary measure, the safety catch of the rifle is always set when the squad is deployed near the front lines. This is especially true in the jungle, where the trigger may become entangled in the undergrowth and be tripped accidentally.

Methods of muffling the sounds of ejecting and reloading rounds are not taught. If a sniper wishes to do so, he can use the expedient of moving the bolt slowly.

Although snipers recognize the distinct advantages offered by high ground, it was said that *Japanese training makes no mention of firing from trees.* Since so much is left to the discretion of the individual sniper, this may be true. It must be remembered, however, that Japanese snipers have repeatedly posted themselves in trees.

German Press Comments on the Ardennes Breakthrough

Translated and compiled at the Command and General Staff School from German newspaper articles.

Der Neue Tag (Prague), 19 December 1944:

The German offensive in the west stands at the forefront of all events. Powerful German formations have launched a major attack on the Western Front. The initial concentration before the German attack, which came as a complete surprise to the Americans in spite of the constant superiority of the enemy in the air in the neighborhood of the front, was an unsurpassed masterpiece of German commandership. The German forces advanced over a broad front from the West Wall zone between the Hohes Venn and northern Luxembourg (see map, page 89). A short but powerful artillery preparation and the intervention of German fighter and attack planes supported their advance, and our forces overran and broke through the American lines at the first attack.

The intervention of powerful formations of German fighter planes, which together with the antiaircraft artillery shot down sixty-nine enemy fighter-bombers and other planes over the combat area, shows the intensity of the German air activity, which is of considerable significance. The conclusion may be drawn from this that for the first time in a long while the German soldier on the Western Front was able to fight again with powerful German air support, presumably even superiority in the air.

Hamburger Fremdenblatt, 21 December 1944:

German armored divisions of the Army of the West have shown the enemy command that the war has been by no means won by them, but has taken a turn that may have very unpleasant consequences for the war lords of the other side. If General Eisenhower is accurately informed relative to the military situation in Belgium and Luxembourg—which he hardly has been of late—he must be well aware of the fact that the local attacks of German troops reported to him by his Army Commander, General Hodges, have since first reports assumed a very suspicious character. Since that time he has doubtless learned the magnitude of our great attack. The vulnerability of his First Army—and particularly its right wing which has constantly surrendered forces for use on other sectors, thereby becoming more weakened than was justifiable—has created a situation which cannot but be of influence in the fighting east of Aachen. Without any question, there are no longer sufficient forces in this right wing to constitute a combat group.

Eisenhower is obliged to withdraw units from other fronts and to draw on forces pulled back for re-equipment or still available far to the rear. With the help of these forces it is likely that he has had to build up a maneuverable force which is now opposing the steady advance of our divisions, the operations of which continue with unabated impetuousness. Halting places which yesterday seemed practical lie today far to the rear of the German troops. Only very skilful and resolute command on the part of the overrun and surprised enemy will be able to master the present situation.

The reserves he has so far been able to bring into this area have hardly had the opportunity to deploy before being hurled back by us. This reveals the weight of our attack and shows the uselessness of throwing reserves, as they become available, into battle in an attempt to stem the flood of German armor, and the necessity of assembling them farther to the rear—at the risk, however, of losing still more ground than during the first days of the offensive.

Even though the Supreme Command of the Wehrmacht continues to maintain a high degree of secrecy with regard to events on the front, yet one thing is certain—the attack is in progress, and hurriedly collected reserves have not been able to arrest its progress. The offensive is being steadily fed by our own reserves. Troops brought up from the rear zones have reached the front, and the

armies engaged in the attack are enabled with still greater impetus to continue their advance. This, incidentally, is about all the enemy is able to announce. The breakthrough has already left a large number of enemy strongpoints behind it. A large part of them have already been mopped up, and as a result we now have the first figures relative to enemy prisoners and losses. Yet the first 10,000 prisoners thus far reported and the 200 enemy tanks that have fallen into our hands give no adequate idea of the extent to which the First American Army has been crushed.

The enemy pressure before the Aachen and Saar fronts is beginning to slacken. This is an absolutely inescapable consequence of the breakthrough through the center of the enemy front. Both the enemy armies in the north and the Third American Army on the Saar front will be obliged to take measures to meet the situation, since their flanks along the breakthrough area are now left hanging in the air and are endangered.

But we must not assume that the enemy will stand idly by and see his First Army defeated. Eisenhower is not the man to give up quickly when something goes wrong. He has far too many troops to do this if he pulls his forces back out of the sectors where they have been engaged and throws them into the Belgian area in an attempt to save the situation there. Nor do our armies anticipate anything else. They are prepared for a clash with the main body of enemy forces and will initiate it with the same vigor that has characterized their operations since 16 December.

Der Neue Tag (Prague), 22 December 1944:

Up to the present, the enemy has been unable to offer any solid resistance to our attack in the west which, after crushing the enemy's positions in the Eifel, has penetrated into the Belgian Ardennes.

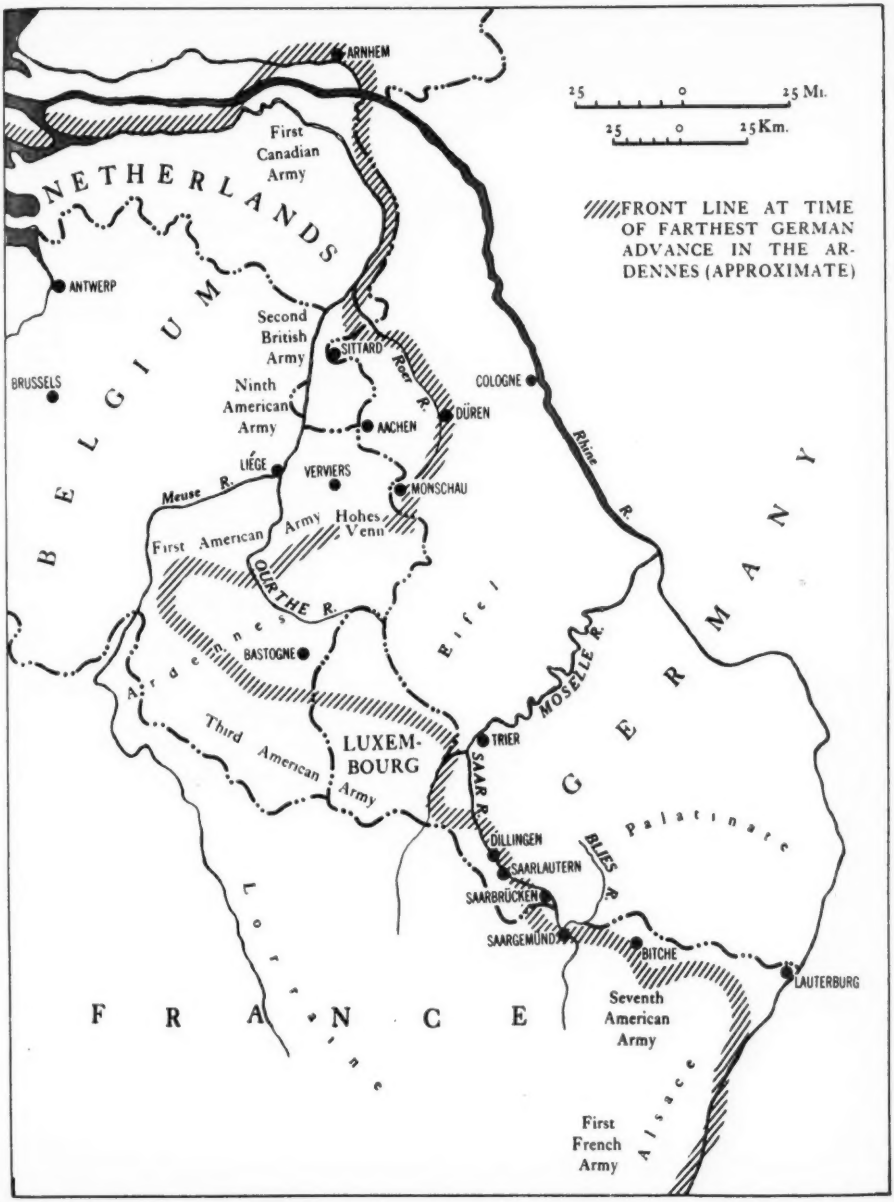
Making use of the close terrain and of the misty weather, which has hindered the enemy in his bombing and reconnaissance activities, our troops have repeatedly succeeded in overtaking and annihilating the enemy's retreating columns or in scattering his reserves. The great number of tanks and guns that have been captured in these engagements confirms the effectiveness of our operations, while the additional 136 American tanks that have been put out of action and the number of prisoners, which has now reached the figure of 20,000, testify to the severity of the blows that are now being dealt the First American Army. At his former directions of main effort, the enemy has attacked with reduced forces, but has increased the intensity of his artillery fire.

The thrusts southwest of Düren against our Roer bridgehead were unsuccessful. On the Saar front the enemy tried to effect new penetrations of our positions by means of new combat methods without having to pay for every step with streams of blood. Thus, at Dillingen he engaged several tanks accompanied by sharpshooters against our bunkers. But well-aimed artillery fire drove the assault groups back. Likewise, all attempts to protect advanced tanks from our annihilating fire by digging them in, as had been done on the Blies, proved unsuccessful. Neither were the efforts of tanks in combination with flame-thrower troops of any avail against our fortifications on the Palatinate frontier region. The common characterizing feature of the fighting between Saarlautern and Lauterburg was the powerful artillery fire which rose to heights of great intensity.

Thousands of grenadiers gazed after the V-1 projectiles which today were pursuing their course westward with especial frequency. I myself within a period of a very short time saw at least twenty of these missiles with flaming tails disappear on the horizon or heard their howling roar die away in the distance.

The surprised enemy attempted to defend himself in a few places. Tree barricades and mines had to be detoured, and removed by other troops which followed. American tanks intervened in the fighting and a considerable number of them were knocked out by close combat means.

At first the enemy's pursuit bombers were conspicuous by their absence, then they came in great masses as soon as the German col-


ARNHEM
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First Canadian Army
NETHERLANDS
FRONT LINE AT TIME OF FARTHEST GERMAN ADVANCE IN THE ARDENNES (APPROXIMATE)
ANTWERP
Second British Army
SITTARD
Roer R.
COLOGNE
BRUSSELS
Ninth American Army
AACHEN
DÜREN
Rhine R.
BELGIUM
LIÉGE
VERVIERS
MONSCHAU
Meuse R.
First American Army
Hohes Venn
OURTHE R.
Eifel
GERMANY
Ardennes
BASTOGNE
MOSELLE R.
Third American Army
LUXEMBOURG
TRIER
SAAR R.
DILLINGEN
Palatinate
BLIES R.
SAARLAUTERN
SAARBRÜCKEN
SAARGEMÜND
BITCHE
LAUTERBURG
Seventh American Army
FRANCE
Lorraine
First French Army
Alsace

umns had been recognized. They dove down at the roads, dropped their bombs on farm buildings, and poured their bullets into traffic jams. During the entire day the enemy's air activity never slackened. German antiaircraft artillery and German fighter aviation gave the Spitfires, Lightnings, and Mustangs plenty to do.

But in spite of all the enemy's air activity, the traffic on the highways never ceased. On the contrary, during these periods of confusion the drivers doubled their efforts to get through.

Hamburger Fremdenblatt, 23 December 1944:

"The bright star of the Allies is declining." In these words the English war reporters sum up the developments on the German front in the west. The word "retreat" shows up everywhere in the English and American front-page-news. The Belgian population, without any shedding of tears, hauled down the flags of England and the United States, the Union Jack and the Star Spangled Banner, and stared in grim silence after the departing North Americans.

Their "victory" has now again withdrawn to a considerable distance, and the Germans have gained time in which to perfect their new weapons. Regarded as a whole, therefore, the war situation has changed in recent days definitely to the disadvantage of the Allies. The American troops who are surrounded in the various separate areas are fighting, it is true, with courage and endurance, but their enemy has captured their supply depots and cut their lines of communications.

In London the morale barometer has reached a new low. The government is attempting to cheer the public with the assurance that "Eisenhower will find a way to handle the situation; we must just have patience." But that is slim comfort to the sorely tried Londoners, with flying bombs hurtling through their skies, and who, in September, had been fed with the hopes that the war would be as good as ended by Christmas. The friends of Montgomery are again causing talk by asserting that the breakthrough would have been avoided if he had been in Eisenhower's place.

Why was the front so weakly manned in the Monschau-Trier sector? That is the great question that is asked in all the newspapers of the Anglo-American countries and also in France and Belgium. The supreme command maintains silence and the military critics attempt to answer the question by saying that no one had counted on a German attack and that, besides, an advance against Cologne and Saarbrücken had been in progress. But it is hard to get the man on the street to see this explanation.

From surprise at first, the psychological effects in the case of the enemy changed over to a "Let them come!" attitude which now has changed into earnest worry. Two of the main factors that have caused this new turn in the enemy's attitude are these:

1. On the seventh day of the offensive, the German command still possesses the initiative, and is determining the tempo of the operation, and is threatening so many vital points that the enemy has now become wholly uncertain just what the German objective may be.

2. The terrible drain of strength that the First American Army has suffered, the losses of men and war material, must already be very great for the enemy to admit it as openly as he does at present.

Der Neue Tag (Prague), 27 December 1944:

The High Command of the Wehrmacht reports: In the west the point of main effort in the fighting has shifted to central Luxembourg. After bringing up new forces which had to be taken from other front sectors, the enemy attempted at this point to break into our southern wing and relieve his forces surrounded at Bastogne. In hard fighting, the enemy attacks have been repulsed and the ring around Bastogne narrowed. West of the Ourthe, after warding off numerous enemy counterattacks, our advance elements are again pushing forward. Since the beginning of our attack in the west on 16 December, more than 700 Americans tanks or armored vehicles have been captured or destroyed. German fighters yesterday engaged strong enemy air formations in com-

bat and prevented them from aimed bombing.

Pressing resolutely ahead, our forces in Lorraine have retaken the Blies sector east of Saargemünd and captured the much-contested Schliesseck works at Bitsch [Bitche] in a surprise attack.

Völkischer Beobachter, 5 January 1945:

The German counterthrust has demonstrated to what a high degree the Anglo-American combat forces are tied up with their air combat forces and how without the protection of their bombers and fighters—which were hampered at the beginning of the offensive by unfavorable weather conditions—they are unable to offer any worthwhile resistance.

The enemy, who had thus been forced into hard straits, waited most eagerly for the chance to use his air forces. And sure enough, as the weather cleared, American fighter-bombers and fighters immediately appeared over the Ardennes and in the earliest hours of the morning sought, over the close terrain of the front, the packs of German tanks and their communications routes. And they were completely surprised when they encountered over the combat area hundreds of German pursuit planes concentrating on the task of protecting the movements of their own troops from the action of enemy fighter bombers. The Americans were not yet able to make use of their heavy bombers since area bombing, with the troops mixed together as they were, would have endangered their own forces.

Recklessly the German fighters attacked the enemy, whether they encountered him in his attacks on our supply lines or in the immediate front area. They applied such pressure to the American formations that the latter were obliged to reinforce themselves numerically to avoid being outdone.

The sonorous hum of the four-motored bombers sounded over the front. They were in search of the airfields of the German formations, a sign of how hard the enemy had been struck and shaken by the sudden massed blow of the German aircraft.

Day and night, our technical personnel worked unremittingly in snow and freezing temperatures at their machines in order to get ready just as many planes as possible.

The destruction of a considerable amount of moving vehicles, including trains transporting motor fuel, as well as the destruction of important railway installations and motor trucks, were observed by our fighters. Bastogne, Liége, Verviers, Sittard, and other collecting points were effectively bombed several times at night.

Harassing attacks occurred almost every night over the areas in the vicinity of the front and interfered with the enemy's transportation. They extended as far as the Brussels area. In spite of heavy antiaircraft defense and night-fighters, our aviators carried out their plans in a systematic manner and caused the enemy considerable losses.

Deutsche Allgemeine Zeitung,
14 January 1945:

Four weeks have gone by since von Rundstedt's powerful offensive thrust against the Luxembourg-Belgian area crushed this sector of the American front. The effects resembled those of a double blow to right and left which caused leaks, so to speak, in the Aachen and Saar regions, thereby compelling the energies stored up there for major operations to flow off and exhaust themselves in another direction. This direction, from the point of view of the enemy, was contrary to his interests and was operationally useless.

This occurred on so large a scale that the heavy, and in some sectors dangerous, pressure in the two above-mentioned combat areas—the Alsace and Saar fronts—changed over to a suction which the German command followed after with astonishing skill. Here there resulted, as fruit of the winter operations, a far-reaching forward movement in many important sectors, leading clear to the Maginot Line and beyond.

When we apply the proper standards, we see that the direct and indirect effects have arisen in consequence of an operation of a very obviously locally limited character in connection with which no long-range operational expectations had existed on the part of Germany. It is, therefore, probable that, to

begin with, the objectives had been only quite limited, objectives which were not wholly unlike those that really were attained, and in connection with which the deep effects resulting from the disagreements in the enemy countries could scarcely have been expected by Germany.

From the military viewpoint, the most important fact, and one which is openly admitted by the enemy, is that because of the number of men and quantity of material lost in this winter operation, their operational plans must be postponed. We are not juggling with periods of time that cannot be determined. What is certain and of worth to us is the absence, at the present time, of the direct and serious threats which really existed on the Western Front in December before the beginning of the winter operations. Whatever may come about, the increased freedom of action which General Field Marshal von Rundstedt has won for the German command through his winter operations in the west is of advantage to us on all fronts where our strength is being tried anew. These, therefore, are successes constituting the reward of a supreme effort.

Artillery Offensive

Digested at the Command and General Staff School from an article by Captain W. R. Young, Royal Artillery, in *The Journal of the Royal Artillery* (Great Britain) April 1945.

IT is probably true to say that the only army in this war which never wavered in its faith in artillery was the Russian Army. When Stalin declared in 1942 that "artillery is the god of war" he was not announcing a new discovery nor restoring "the artillery to its prime importance on the battlefield from which it has been ousted by heavily armored tanks"; for, in the Russian view, it had never been so ousted. Indeed, from the very start of the Russo-German war it was clear that to admit the supremacy of the tank would be a doctrine of despair since the Germans had, at the outset, an overwhelming superiority in that arm. Fortunately, however, the Russian artillery had a tradition in defensive fighting which was more than a century old and yet right up to date in its application. The Order of the Day issued by Count Kutuzov at Borodino in 1812 may not, perhaps, be as well known as it deserves to be and, as it invites comparison with a modern tradition of "fighting guns to the muzzle," it is here reproduced:

"Let it be known to the commanders and officers that only by standing our ground courageously within the shortest grapeshot range shall we succeed in not yielding a single step to the enemy. The artillery must sacrifice itself. Even at the risk of being captured together with your ordnance, fire your last shot at the enemy. A battery which acts thus, even if captured, will more than compensate for its loss."

It was in this spirit that Russian gunners fought the defensive battles of 1941 and 1942 and the last defensive battle of Kursk in July 1943. And even after the Soviet armies had settled down to a continuous strategic offensive, it was artillery fire in the main which beat off the German counter-attacks, secured the flanks of the Russian wedges, and prevented the relief of encircled German divisions—which are all, however, tactically defensive tasks.

Artillery in the Offensive

But if the Russian artillery had little to learn in defense it soon found that attack was a more complex proposition, and, quite early in 1942, the Soviet command, disappointed at the limited progress of the winter's offensive, began to re-examine its artillery doctrine. It "considered that the accepted methods were not justifying themselves as fully as had been expected. The enemy's fire weapons were so effectively protected that it was not enough to silence them. They had to be smashed to atoms.

"When the enemy's outer defenses had been pierced, the advance became very much more difficult. The usual methods of supporting the infantry by an advancing barrage or by successive fire concentrations became impracticable and did not achieve their purpose. This resulted in interruptions in artillery fire and lack of coordination with the attacking troops. Attacks often failed or petered out before breaking into the open."

This presentation of the problems of the initial break-in and the exploitation of the breach is quoted in full from an article on "The Experience of the Soviet Artillery" by Major General F. Samsonov, published in 1942, because it might otherwise be though that it came out of the head of some last-war gunner. For these are not new problems but very much the same as those which faced us from 1915 to 1918. But it must be remembered that the Russian Army of the last war did not have the long and bitter experience of attacks against strong positions which we had during those years; and it must be confessed, also, that we did not find any completely satisfactory answer to the problem. What solutions the Russians proposed are set out under the general term "artillery offensive" in Samsonov's article.

First Phase — Destruction the Aim

Chief place among the general ideas must be given to the emphasis laid on destruction as the object of artillery in the first phase of the offensive. The enemy's fire weapons must be "smashed to atoms," not merely silenced, says Samsonov, thereby going against all the experience of the last war. For it will be remembered that, as early as 1916, British gunners discarded complete destruction as their object—since it was found to be impracticable within any reasonable time limit—and devoted their efforts to perfecting neutralization. In this war, too, though the idea of destruction has occasionally shown signs of revival it has been hastily disclaimed when experience has confirmed the old lesson that "artillery does not kill dug-in infantry" or taught the new lesson that monster concentrations seldom hit small targets like the enemy's fire weapons.

The Russians, however, were forced by the nature of the German defenses to adopt destruction as their aim. For, when the enemy's machine guns are firing from roofed emplacements—from cellars and bunkers, pillboxes, and dug-in tanks—the neutralizing tactics of barrages or concentrations simply will not work. New methods had, therefore, to be evolved and they seem to have proved, on trial, to be effective.

The first factor in the new tactics was a great increase in the number of guns allotted for a breakthrough operation. The density at Stalingrad in 1942 was one gun per four yards; at Kiev in 1943, one gun per three yards; and at the Karelian Isthmus in 1944, one gun per two yards. These figures, however, are rather misleading since the "guns" include 45-mm antitank guns and even mortars. And they will seem all the less remarkable when we recall that densities of an 18-pounder or better per six yards were sometimes reached in the last war. So the Russian success cannot be attributed merely to large numbers of guns.

Perhaps more of the credit is due to the use made of direct fire—the second outstanding feature of the new tactics. "Practice has shown," says Samsonov, "that artillery preparation is most effective when a section of the guns (of all calibers up to 203-mm) are brought forward to fire over open sights at the embrasures of the enemy's forts and other strongly fortified positions. This method *reduces the time* necessary for destroying the defense works and *enables the infantry to approach* the object of attack without loss. It has also been found far more effective and economical than spreading the fire over whole areas, for *individual batteries are allotted individual targets.*"

But the whole secret cannot lie in direct fire—a tactical method which is impracticable on some *terrains* and not always advisable on others. Is it not, rather, indicated in the phrases in Samsonov's article which the present writer has presumed to italicize as embodying the essence of the "artillery offensive" in its initial phase? For the first problem is how to reconcile the

necessity of artillery preparation with the desirability of surprise; and the answer is by cutting down the length of the preparation and letting the second, or assault, phase follow immediately upon and merge with the first. The other problem is to ensure that the preparation is effective (which, in the case of bunkers, means direct hits) and once again, that it does not take too long; and the answer is by allotting individual targets to individual batteries and, in a word, by gunfire.

A Principle—With a Difference

This mass of guns all firing together illustrates what Clausewitz calls the "simultaneous application of forces"—but with a difference at the target end. For whereas Clausewitz and others usually visualize successive concentrations against fractions of the enemy's forces, the Russians aim at engaging at the same moment—and so destroying at the same later moment—*all* the forces which the enemy has deployed. It is necessary to stress this distinction lest we derive false ideas from the frequent appearance in Soviet reports of the phrase "massed fire"; for the fire in the opening bombardment of the Russian offensive is concentrated in time but it is distributed in space, and there is no evidence of artillery commanders switching enormous "batteries" about from target to target. That method, experience shows, seldom scores direct hits.

Second Phase — The Creeping Barrage

With so much destruction of overhead cover achieved in the first phase, it is obvious that the opportunity arises for the creeping barrage; and there is evidence, in spite of statements to the contrary, that that is the Russian artillery's normal method of covering the assault.

British gunners and infantry may be interested to learn that, though the Russians seem officially to advocate an ample "safety distance"—"the tanks advance 100 yards and the infantry 150 to 200 yards behind the creeping barrage"—they often ignore the instructions in practice. At Bobruisk, for instance, in June 1944, the commander of a regiment, which had to force the River Drut, "decided not to wait till the artillery preparation was over and began to force the river while it was still at its height. The troops crossed . . . almost under the fire of their own guns . . . The Germans did not expect our troops to appear so soon and most of them were still in their shelters."

Third Phase — The Battle in the Depth

"The First World War," writes Marshal Voronov, "provided comparatively few examples of an operational breakthrough. Quite different is the Red Army's experience." He points out that the Russian offensive at Stalingrad led to a general collapse of the German front, and we know that this sort of result became quite usual in subsequent offensives. Voronov speaks of "the *massing of fire* during the battles in the depth" and of the troops advancing through the breach being "provided with *artillery escort*."

The "artillery escort" clearly refers to guns which, according to Samsonov, "are attached to rifle companies and even, in some cases, to rifle platoons before the battle begins and remain with them till it is over"; and also to the "light guns advancing with the infantry" which are reported by Major General Antropov to have done "particularly good work" in the battle for Orel in August 1943, where, "firing over open sights, they shattered barricades and demolished nests of enemy resistance." but that this kind of close support was not only afforded by infantry guns and light artillery is plain from Polevoy's description of "the *main mass of the heavy artillery*" moving "in the center of the wedge" and coming forward to the tip of the wedge when strong resistance based on prepared positions is met with.

Nor is it always a question of mobile guns and direct fire, for other accounts show that the Russians are not unmindful of the principle that the shell is the weapon. "Artillery spotters go along with the advancing infantry," says one such account; "As soon as they detect a new German firing point they contact the gunners who pulverize it into inactivity."

On the whole it seems probable that much of the fire called for by forward observers on the ground or in the air—for cooperation with aircraft is mentioned by Samsonov—does take the form of concentrations and that this must be the "*massing of fire* during the battles in the depth" referred to by Marshal Voronov. But it is likely that the concentrations are of very modest dimensions, if only because of the withdrawal of many of the guns which had been massed for the break-in, and the dispersion of the remainder over the widened battle front which always results from a breakthrough. And there is plenty of evidence that the concentrations program is not planned in advance.

The Limits of Planning

It seems, indeed, from an averaging of many reports, that the Russians do not set much store on planning the third phase of the artillery offensive. "In general," says Samsonov, "one can hardly ever expect the attack within the enemy's defenses to proceed as planned. But this does not mean that the planning of this phase can be neglected." Later, however, he says that the planning must wait till the capture of the first objectives makes it possible to get a glimpse of the next zone of defenses; and then adds, rather significantly, "Another method is to send observers to accompany the advancing troops and to direct the batteries to targets interfering with or likely to interfere with the advance." We can safely state that the artillery support for the third phase is not planned beforehand but improvized to meet circumstances as they arise. And this is what may be expected when we consider the great width and depth of a Russian breakthrough and the large amount of decentralization which is called for by the policy of always providing artillery support for "even such small units as platoons" (of cavalry) in their most adventurous raids.

Conclusion

On that note—of adventure—it is fitting to conclude our study of the Russian artillery offensive. For the impression which remains from the reading of many Russian battle stories is that, in spite of the centralized organization of the artillery, the junior commander—of battery, troop, or even guns—seems to find so much scope for exercising initiative and expressing individuality. From the opening bombardment, when he scores his direct hits on *his own* share of the available targets, he passes rapidly to the phase of the battle in the depth—and then almost anything might happen.

If esprit de corps is to be relied upon to any extent to mould and strengthen the character of a unit, it is obviously dangerous to appoint to that unit any leader who does not fully share its spirit and tradition and who is incapable of fully accepting and upholding them. One of the disadvantages of an exaggerated unit spirit which overshadows a sentiment for the army as a whole or even patriotism is this difficulty of assimilating the new leaders who may have to be transferred to it at any time. But this is a difficulty which must be overcome, and it is the business of those selecting NCO's, or selecting leaders of any rank for promotion, to satisfy themselves that they are thoroughly imbued with that pride of unit upon which dependence is made.

—Major General Costello in
An Cosantóir (Eire)

Consolidation of Positions in Pursuit

Translated at the Command and General Staff School from a Russian article by Colonel P. Boldyrev in *Krasnaia Zvezda* (Red Star) 16 February 1945.

THE advance of Soviet forces, especially during the pursuit of the enemy, develops with great rapidity. Not infrequently, our units, especially mobile ones, penetrate deeply into the enemy's dispositions and carry on their operations independently. At the same time, however, the experience of recent actions shows that German troops, in spite of colossal losses of men and matériel, continue to offer stubborn resistance and counterattack with armored forces and infantry. The enemy attempts, by means of counterattacks on our flanks, to encircle attacking units that have wedged themselves deeply into his positions. It is logical that this should require on the part of our attacking forces a skilful consolidation of any success they may have achieved, and unbroken security of flanks and rear.

One of the conditions of sound consolidation (during brief pauses with temporary shift to defense) of a success achieved during the period of advance is a careful organization of reconnaissance. In East Prussia, the northern flank of our forces was constantly secured by the reconnaissance planes. Strong detachments, including armor, carried on the ground reconnaissance on this flank. Among other benefits resulting from this was the timely discovery of a large force of German tanks and motorized infantry preparing for a counterblow at a distance of some fifteen or twenty kilometers from one of the divisions advancing on our flank. Counterattacks were met by organized fire, after which our troops completely destroyed the German group.

It is necessary to secure the flanks by means of powerful mobile detachments. These move either continuously, parallel to the main body of forces, or by bounds. It is indispensable that these detachments possess the necessary artillery, mortars, tanks, and engineer units. Also, they further assure the success of their activities by the use of reliable means of radio communication. On one sector of the 1st White-Russian Army Group, reconnaissance warned a mobile detachment of a flank attack by the Germans, which appeared imminent. The detachment quickly made ready and met the counterattacking enemy with a powerful concentration of fire. Engineers had placed antitank mines in locations over which it seemed most likely the enemy tanks would move. The main force supported the operations of the detachment by the fire of his artillery. The counterattack was repulsed.

It is of no less importance to consolidate captured terrain lines and positions, especially in the crossing of rivers. In this case, it is important not only to seize possession of and hold a bridgehead but also to prepare it as a jump-off point for the immediate continuation of the advance.

In pursuit or during an encirclement operation, the activities of the troops are characterized by intensified maneuvering. The situation changes frequently. The forces encircling the enemy are exposed to great danger of sudden counterattacks. Under these circumstances, prompt and skilful consolidation plays a particularly important role.

South of Lodz occurred an episode of this kind. The Germans were about to counterattack. Our command immediately dispatched infantry and antitank guns to the threatened sector. The commander of the infantry, placed these guns at points where there appeared to be particular danger from enemy tank attacks, established telephone communication, and arranged signals for requesting artillery fire. The engineers, with the help of the infantry, quickly planted mines and in a few places installed various inconspicuous obstacles. All the means employed were taken from the reserve.

All the units promptly made their way to their sectors and occupied the positions. The artillery also occupied its firing positions,

with its observers stationed in the battle formations of the infantry. A small number of tanks moved out ahead and stationed themselves at a distance of 300 to 500 meters from the infantry positions. These tanks took advantage of the folds of the terrain and of natural cover, preparing to operate from ambushes.

In a short time, the enemy began his counterattacks in this sector, with small groups of infantry supported by tanks. Our tankmen in the ambushes called for the fire of the artillery and mortars. The enemy was stopped, but afterwards renewed his activities. Then our tanks, with the support of our artillery and mortar fire, attacked and defeated the enemy before he was able to reach the line occupied by our infantry. Thus, our success was consolidated and the main body of our forces continued their advance.

In the consolidation of captured territory it is necessary to give special attention to the defense of large inhabited places and industrial establishments. The Germans engage in furious counterattacks to recover large inhabited places they have lost, leaving behind them garrisons of suicide troops and carrying out powerful air attacks.

In attacks by our forces, our armored and motorized formations are first to break into the cities and occupy them. There have been cases when the Germans allowed our tanks and motorized infantry to pass through and afterwards attempted to regain possession of the city. On this account, in the occupation of large inhabited places, a garrison supported by artillery and, if need be, by tanks should be left there for its protection and with the mission of destroying any enemy submachine gunners that have remained in it. These garrisons occupy outlying districts of the city, individual buildings, and basements, and destroy any remaining enemy centers of resistance.

At night, when the attackers are most likely to make short pauses for the reorganization of their forces, it is particularly necessary to consolidate the positions already reached and get ready for eventual enemy counterattacks. Only after this has been done are other duties to be taken care of. At night, only all-around defense should be employed. Reconnaissance and combat security are intensified. The artillery and tanks get ready for repelling counterattacks.

Experience has shown that it is expedient for each unit to have at its disposal a special reserve for the consolidation of captured positions, for laying antitank and antipersonnel mines, erecting barbed wire, etc. If the situation requires it, special groups should be created, a practice which recent combat operations have completely justified. There should first of all be organized an antitank defense with the inclusion of the guns of the division artillery. Both antitank and antipersonnel obstacles are established as soon as a new position is captured. Arriving at the position intended for defense, the infantry units immediately occupy the area and prepare their positions. The supporting artillery, having occupied its firing position, should, first of all, prepare massed fires for the areas ahead of and on the flanks of the units. Simultaneously with this, all necessary preparations are made, within the limits of the positions, for fires on any enemy tanks that may break through. A number of artillery officers and observers are located with forward infantry elements.

It is best to use the tanks as pillboxes, locating them in ambushes at the main line of resistance or ahead of it. Their mission is to reinforce the fires of the infantry units. This does not exclude the possibility of a switchover on the part of the tanks to a counterattack of any of the enemy that have broken into the position.

Aviation (particularly bomber units) must be ready to carry out massed attacks on the areas ahead of the main line of resistance. Its mission is to destroy the enemy and to afford him no opportunity to launch an attack on our position.

The organization of a dependable antiaircraft defense is of particular importance. By bombing our position, the enemy will attempt to force our units to abandon the captured areas or at least to render them incapable of any further advance. Hence it is

important that our troops have the support of fighter aviation (especially during the period in which they are occupying the position) and also that of antiaircraft artillery and machine guns.

The role played by rocket launchers should also be noted. As a rule, these arrive at the defense line indicated for consolidation together with the main forces of the infantry and immediately prepare for action, covering the deployment of the artillery.

Experience has shown that armored units should be reinforced by supporting groups intended for consolidating and holding captured areas and composed in the main of submachine gunners and engineers, which in turn are supported by self-propelled artillery.

Power of Maneuver

Digested at the Command and General Staff School from an article by "Auspex" in *The Journal of the United Service Institution of India* January 1945.

As we see war today, we are, I think, allowed to accept that the final act of war is the land battle. Whether that will be so in the future we have yet to decide. It is not the purpose of this article to discuss this problem of the future, but we may be allowed to make a certain contribution to it.

The nature of war is regulated by these three things:

(a) The existence of open flanks, or the ability readily to create the open flank by a break-in and through.

(b) The predominance of the mobile arm or arms, which will exploit the open flank. (For land warfare the air arm is a mobile arm of bombardment, and a fast means of transport for airborne armies and supplies.)

(c) The ability to administer the mobile arm to the point at which it will obtain a decision.

With these three conditions in mind we can predict what the next land war will be like, if there were over to be another war. It will be a slow war of powerful defense lines or it will be a dynamic war of areas, fortresses, and mobile field armies. We are in the latter phase today. But what is it that so decisively influences these conditions? Above all, the influence is the weapon that is to predominate in the next war. Thus in this war it is, on land, the armored weapon that has recreated our power of maneuver. Closely interwoven with it is the fresh new phenomenon of war, air power.

Since the final and vital act of war is the land battle, the vital fact in war is that that land battle must be won. Thus, little as we may care to acknowledge it, the whole effort of the nation at war is devoted to one end and one only—the winning of the final land battle. No matter what support the other services may give, that battle will only be won by a highly and expertly armed and trained land army handled by a master of his art. Let us be quite certain on that point, for we must realize that its armament must be in the end essentially an efficient *offensive* armament.

Every single army since the dawn of war has striven to gain power of maneuver. In effect, it has striven for the ability to bring fighting power to the decisive place in proper time, and so to win its battles and the war. This is something more than pure mobility; it is the power of maneuver. Having obtained a sufficient power of maneuver, the natural outcome of this effort is that the army seeks at once to strangle the power of maneuver of its enemy with the ultimate object of winning the final and decisive land battle. Thus, the earlier in the war that an army is ready to start in on this strangling process the better, and the sooner will it finish the war successfully. For this object, it will seek every aid within its reach. It will seek the help of air and sea power. In fact, these with their longer reach will be the first to come into action in this process.

The phenomenon of this war has been the growth of air power and its decisive influence on war in all elements. Superior air power has started in all cases the process of producing its owner's power of maneuver, and of whittling down that of his enemy. The very first task of war has been to trounce the enemy's air power in both the strategical and the tactical field, so as to allow the whittling process to start. From this have come about certain lesser effects, such as the restriction of the power of maneuver of naval fleets in the face of unbeaten shore-based air power, and the growth of seaborne air forces to combat the restrictive influence of land air power and to limit the power of the opposing naval fleet. It is in the recent American operations in the Pacific that we see these great changes proceeding, following as they do on the loss of sea supremacy after the destruction of our warships in the Malayan catastrophe. Always, the first battle is for air supremacy, general or local.

But perhaps the most important result of the arrival of great air power is the effect it has had on the general strategical conception of war. It has produced a new object before us, that of advancing our air bases in a scientific pattern so that the fullest power for destruction can be developed from our land-based air forces. Following from this we get a new balance of values between the sea spaces and the land masses. Air power is utterly dependent for operational needs and for its very sustenance on the land masses, not on the sea spaces.

In the old days we regarded the sea with all its dangers as a strength to us. In the last war and again in this it nearly brought about our ruin, and would certainly have ruined us if our enemy had early grasped the value of long-range air forces as a destroyer of sea convoys, the most vulnerable of all forms of transport with so many eggs in each basket. To have lost our liberty to move on the seas would have killed us. Only when air power has virtually destroyed its opponent in the appointed area can we safely launch our combined operations of army and naval forces across the oceans. If the enemy has eyes with which to see our movements over the wide seas, then he knows generally where we intend to land. He can then reinforce and redispose his forces, and our problem is once more to strangle that movement. If the movement must come over the sea, so much the better for us, provided that he is unable to protect it. That is why we see island after island falling to American air, sea, and land power. And so we set down one lesson, and

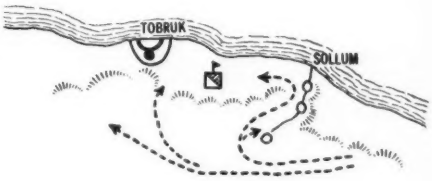


FIGURE 1.
BATTLE OF TOBRUK—NOVEMBER-DECEMBER 1941.

it is that a nation must seek from the outset to fight its war where it can most easily and so swiftly strangle its enemy's power of maneuver. In peace it must know how best to bring this about early in a war.

So in the Pacific and in northern Europe today, our air bases are being thrust forward by the combined action of all three services, and bit by bit we are thereby tightening our grip on the enemy's capacity to move his fighting power to the decisive point of the land battle.

Now let us look at a few battles of this war. We will select some that are clear-cut and well defined.

Rommel laid siege to Tobruk (Figure 1). To cover his siege operations he occupied a field defensive position, virtually linear, with its right flank open. A field fortification is not designed to stand siege, for times and resources do not allow of its being munitioned and supplied to fight for a prolonged period once its flank is turned or its front penetrated. Turn to (a) at the beginning of this paper and then remember that in those days, in that open desert, (b) also obtained and so, with good staff work, did (c).

In our favor, (a) and (c) already existed. But the Axis was more powerful than we were in the mobile arm. Before we could win a decisive battle we had to gain predominance over our enemy in (b). With these three in our favor we would finally gain absolute power of maneuver and whittle Rommel down to impotence; with that, Rommel's infantry field defense would fall as the Roman infantry fell at Carrhae, besieged by mobile troops. Thus, directly we threatened to lay siege to these infantry positions, Rommel must try to relieve them; that is, he must

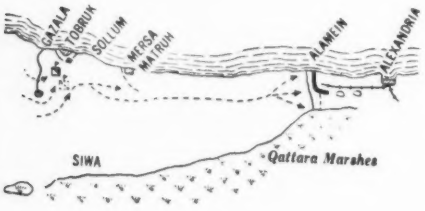


FIGURE 2.
GAZALA TO ALAMEIN—MAY-JULY, 1942.

dance to our tune. This would at once restrict his freedom of maneuver and so his power of maneuver.

The British commander, therefore, decided to stake everything on getting this one thing, (b), in his favor. Fortunately, Rommel had restricted the mobility of his armored forces by so disposing them that they were almost penned in between the escarpment and the sea. General Auchinleck was going to destroy the enemy's mobile forces by every means at his disposal, air and land, starting with air attack to subdue his air power and to strike at his administrative means of retaining his power of maneuver. For the rest, he mounted his infantry, and for nearly a month, completely mobile, he sought battle with the enemy's mobile armored forces and, in the end, virtually destroyed them. Deprived of his arm of maneuver, Rommel raised the siege of Tobruk and fled westwards. Our power of maneuver had become absolute.

Behind him Rommel left his infantry of Carrhae, which was besieged and reduced in the field.

There are rules of what I may call "normal war"—the war of fortresses, of sieges, of assaults, and of mobile field armies—whatever wise people may say. Rules are made to be broken, if one accepts the risk; and we are told that there are exceptions to rules.

Some rules or war change or disappear; some are eternal.

Here is one rule (count the number of battles that have been lost in this war through disregard of this rule): *You cannot hold a field defensive position if you are weaker, or become weaker, in the mobile arm.*

What then are you, in these circumstances, to do? The answer is to get into a fortress position. Figure 2 is a diagram which shows the battlefield of Gazala and the fortress of Alamein on which General Auchinleck stopped the Axis rush for the Delta, and where, in October 1942, was fought the great epic of the 9th Australian Division.

At Gazala we committed our mobile arm, which was weaker than that of the enemy, to keep a linear field defense in position. A threat to the security of that position must of necessity draw our weaker mobile forces into battle. We had thus restricted the power of maneuver of our reserves before the battle started.

Rommel, by a flank move, exerted the threat and brought our armor to battle and finally defeated it. A large part of our infantry force was cut off at Gazala and later on in the desert, and captured. The Tobruk fortress, lightly held, was stormed and taken. That any infantry got away from Gazala and Tobruk was solely due to the fact that some of them had their "horses" with them. Had this not been so, the infantry would have been besieged in the field on the Gazala position and there destroyed.

Alamein was a fortress that held within it a large quantity of munitions and supplies.

A new power was coming into being, the heavy bomber, to take its part in the new siege train of a mobile army.

Figure 3 is a diagram of the battle of Normandy, 1944.

The British and Americans had a powerful mobile force. The power of maneuver of the whole German Army had been reduced by tremendous air attacks against rail centers, bridges, and other communications, and against all forms of mobile arms and motor vehicles. They tried to "seal off" our landings by getting into wide-flung field defenses. Bradley employed the new weapon of air bombardment and burst through with a great mobile force; then the end came. The German northern wing was besieged at Falaise in the open field and virtually destroyed, its power of maneuver gone. Patton, with absolute power of maneuver, launched forward to what appears now to have been the limit of his administration, at which point his mobility, and so his power of maneuver, died away.

What of Japan? The process of whittling down her power of maneuver has only recently started, but she is the most vulnerable of all Powers, for she carried her fighting power over the seas with utterly insufficient air power to escort it to its destination. So weak is her power of maneuver. It was an act of idiocy, manifesting the intellect of a moron, ever to enter a war as an island nation understanding little more than the implications of air power that Germany had manifested to her in 1939-40, obviously not having grasped the vital need of all war, the retention of the mobility of a sufficient

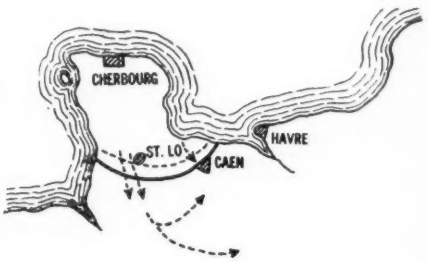


FIGURE 3.
BATTLE OF NORMANDY, 1944.

fighting power. Today the tentacles of air power, moved by the sinews of sea and land power, are around Japan and she is being strangled; the life breath of war even now begins to whistle in her gullet. Soon after we have strangled Germany we will suffocate Japan for ever, for the power of maneuver is the breath of war.

Bomb versus Battleship

Digested at the Command and General Staff School from an article by B. J. Hurren in *Flight* (Great Britain) 26 April 1945.

AT the end of the 1914-18 war, the RNAS [Royal Naval Air Service] was in nowise the counterpart of the later-formed combined RN and RAF Fleet Air Arm, which dates from 1923. It was something of a naval flying service, mainly operating with seaplanes, but entirely without the modern conception of landplanes operating from the decks of aircraft carriers.

In parallel with the first developments of the modern aircraft carrier, which led to the wholesale employment of landplanes for naval flying, the newly-formed RAF (1 April 1918) had as the forerunner of the present Bomber Command a division known as the Independent Air Force [IAF].

The IAF was designed to operate in much the same way as the present Bomber Command. It had a preference for bombing Berlin, but in fact the war ended before the big Handley Page bombers could take off on that mission.

We thus see the seeds of a controversy that was to part good friends and threaten amicable relations between the tradition-steeped Navy and the new-comer RAF. The former felt it had something extra special in its aircraft carriers, whilst the latter was equally sure it was no longer a stunt but a ferocious weapon in the hands of those who knew how to use air power.

Behind the scenes, the controversy waxed

hotter month by month; not the less because a large part of the Navy itself could not place faith in a naval air arm. The crux of the matter was the aircraft carrier. One school of thought said, broadly, that the carrier would never fulfil its mission since bombing would sink it or prevent it from operating aircraft. The other school asserted that the elements of surprise and long-range attacks without warning could be mounted by the aircraft carrier which—even with losses—would justify itself by its novel striking power.

The basic controversy was Battleship vs Bomber, with the rider of Bomb or Torpedo.

To settle the issue, an important trial was staged in (I think) 1923, with the old warship *Agamemnon* as a radio-steered, crewless target at sea. Two aircraft were to make the attacks with practice bombs dropped from about 8,000 feet. One had to return to base shortly after take-off, thus conceding a fifty percent victory to the antibomber school.

The second made the programmed attacks. In the cockpit was a special signaling device for the bomb-aimer to direct the aircraft's pilot left and right on approach to the target. This device failed during flight, but in order not to disappoint the "customers" assembled for the trial, an astonishing improvisation was effected. A piece of string was attached to the pilot's ankles, and by this means the bomb-aimer literally jockeyed the aircraft into the winning position.

And what a position it was! Of eight bombs aimed at the moving target, two scored direct hits and the remainder fell as near misses.

That was more than twenty years ago. The flaws in the trial and fallacies liable from its results are apparent. First the ship was undefended. Then the bomb run was uninterrupted. Then the technical hitches in the aircraft. Couple with these factors vague claims of new defense weapons and it is easy to see that neither school of thought, whether pro-battleship or pro-bomber, was satisfied.

So divergent courses were followed. Under the blight of the Ramsay MacDonald disarmament era the Navy slowly went ahead with carrier construction, the *Courageous* and *Glorious* appearing before the end of the 'twenties. In this time, bombers made no equal advance, and seemed to be hopelessly outclassed by the naval gunnery experts.

There was, however, one significant fact. There was not at that date much to choose between the orthodox landbased RAF aircraft and the seagoing land-undercarriage aircraft of the Fleet Air Arm borne in carriers.

But it was true the RAF had big bombers, such as the Virginia and Hinaidi, which rumbled along at an air speed of seventy miles per hour.

All this picture was scrapped when the first of the new monoplane fighters and bombers appeared.

The hopes of the bomber school thus soared, whilst correspondingly only the faith of the pioneer few of the Fleet Air Arm enabled the carriers to continue in being at all. For nobody in those days contemplated operating such fast-landing aircraft as a Hurricane on a carrier deck.

The arrester wire technique enabled a reorientation of naval flying ideas. This slight advance in naval form was more than countered by the then secret development of the four-engined bombers, which carried bomb loads so far undreamed of.

Thus, at the outbreak of war the Fleet Air Arm was equipped with fighters and bombers which were inferior in speed, in range, and in bomb load (to say nothing of height and other aspects of flying) to the land-based RAF equipment. The Cinderella Service went into battle under the shadow of suspicion—doubt as to its useful value, in that German bombers would almost certainly sink the carriers, and misgivings to the effect that even if they were not sunk their aircraft would be massacred by land-based defense.

The doubters had a very good case. They went further and made a number of unsupported claims though they observed with bewilderment that the *Ark Royal* was not in

fact sunk by bombs in spite of prolonged air attacks. Moreover, when things began to hot up in Norway, ships which were almost incessantly attacked by German bombers somehow lived to fight on, though some were sunk. *Courageous*, first aircraft carrier victim, was sunk not by bombs but by the deadly torpedo from a submarine. *Glorious* vanished before naval guns, not before bombs.

When Italy took up the sword, the bomber kings were sure the day of the battleship was ended. There were hundreds of competent Italian bombers available—but oddly enough not one of them sank a battleship in all the long years of opportunity in the Mediterranean. Nor was the bitter pill less palatable when British capital ships bombarded Genoa using "obsolete" biplanes of the Fleet Air Arm to spot the fall of shot. They flew at no more than 1,000 feet over the town and it might seem that here, if anywhere, the superior landplanes ashore should have gone into action.

Still doubt lingered over the issue. When Japan struck at Pearl Harbor and wrecked the fleet there, the bomber boys jubilantly—yet sympathetically for our Allies—said: We told you so. Three days later the British capital ships *Prince of Wales* and *Repulse* were sunk by torpedoes from Jap bombers, and again the cry went round that the day of the battleship was done. Air power alone had supplanted sea power in priority and was the clue to the future.

Then a remarkable thing occurred. Using aircraft-carrier aircraft, the U.S. Navy arrested the Jap path of aggression with a brilliant sea-air victory in the Coral Sea. The enemy invasion fleet was routed, although it was *within easy range of the land-based aircraft defense range*, by the use of carrierborne aircraft which had long been thought inferior.

Next, at Midway Island, the U.S. Navy, assisted in small part by long-range land-based Army Air Corps bombers, utterly defeated the most powerful invasion fleet the Japs had ever despatched. This was a contest of carrier aircraft versus carrier aircraft, and the losses in the air were hard on both sides. On the sea surface, however, the Japs suffered a defeat from which they never recovered.

As before, there were circumstances which could be argued in favor of both sides. But the Americans were convinced of the value of aircraft carriers, which they put into large-scale and rapid production. Their program ranged from 45,000-ton super-carriers down to small "flat-top" escort carriers, with the important *Essex* class in between.

Then came the first real test—at Leyte. The Japs had formidable sea forces, operating from a ring of islands on which were, or could be, based the best fighters and bombers. In theory, these land-based aircraft were far superior to the carrierborne, and it was by carrier aircraft alone that the Americans could bring air power to the invasion of the Philippines.

The test was made, and the paradox was that the carrier aircraft won the victory in the air. Fierce battles were fought, but the answer was indisputable. Seagoing air power had proved itself under the sternest test of all—war.

To clinch the matter, action at Luzon and other Philippine islands left no doubt of the decisive result of the employment of carriers. But none of the official bulletins has made the point that only by the use of carriers could the necessary air umbrella be given the fleets at sea. The actions were fought hundreds of miles beyond the maximum range of friendly land-based fighter aircraft.

Early in April this year, however, the issue was put to its biggest test of all. With great daring, the Japanese fleet was attacked in its home waters and within the protective range of the entire home-based Jap air forces. In spite of the protection accorded Jap warships in fierce air encounters between home-based fighters and Allied carrierborne fighters, the American sea-going attack aircraft sank six of Japan's warships, including the mighty 45,000-ton *Yamato*.

Admiral Mitscher's report states that a large force of Jap aircraft was sent to defend the Jap fleet and attack the American sea forces. The result was that 116 Jap aircraft were destroyed, fifty-five by American fighter aircraft and the remainder by antiaircraft fire. Note that for the first time in any large-scale naval air engagement, the antiaircraft ship defenses surpass the successes of the defending aircraft.

But note also the scale of the attack, for on the previous day the U. S. Navy had destroyed 245 Jap aircraft. This was done in the face of the best land-based air opposition.

A British carrier force was also in the engagements in this area. Before the main American action, British aircraft from carriers—and, of course, in the teeth of land-based air opposition—attacked airfields at Ishigai and Miyako (east of Formosa) and on the Ryukyu islands. In other words, the ring of air defense of the home-based Jap fleet was savaged by British aircraft-carrier fighters. In two days, it is reported, the Japanese lost 417 aircraft, mostly in the Okinawa area on the Friday and Saturday preceding the sinking of the *Yamato* on Sunday, 8 April 1945.

Several interesting points arise. The *Yamato*, Jap equivalent of the German *Tirpitz*, was sunk by at least eight torpedoes, eight rockets, and machine-gun fire. The interpretation of this news is that it is not exclusively necessary to use the large armor-piercing bombs such as the 12,000-pound jobs used against the *Tirpitz* in the brilliant attack by RAF Lancasters. On the contrary, a Swordfish can carry a torpedo and rockets. Once again the torpedo is shown to be by far the most dangerous of all present naval weapons.

But, by inference, if a single-engine aircraft can carry the means of destruction of a major modern capital ship, why worry about four-engined aircraft which, by their size, cannot be operated from aircraft-carrier decks? And if there is no patent need for the land-based heavy bombers in a sea action, clearly the case for the aircraft carrier gains the more by that.

The next thing to be seen in the official reports is that the Jap fleet did not rely on its own carrier air forces but on the land-based aircraft. In some astonishing way, despite the repeated lesson of the need of air cover in war at sea, the Jap fleet was unprotected by aircraft (most of them being shot down on the previous days) but relied exclusively on antiaircraft protection. Heavy though this was, only seven American aircraft were lost, against the sinking of the *Yamato*, a light cruiser, a heavy destroyer, and three medium destroyers.

And so, twenty years and more after the furious controversies of the 1920's, vindication of the aircraft carrier has come. It is idle to write down the opposition of the Japanese Air Force, nor will any sane person assert that the best German and Italian attack aircraft are inferior aircraft. The fact of war is that the myth of land-based superiority has been exploded in every sea action where it has been put to the test, with the solitary exception of the slaughter of a flock of Swordfish in North Russia.

However, coupled with this a great change of heart in the Navy is apparent. The new breed of sailors remain faithful to the irrefutable principles of Lord Nelson, but the method of applying those principles now takes in the air arm as a first consideration. Great British Admirals like Vian, Rawlings, and the Commander in Chief, Sir Bruce Fraser, seem to revel in their employment of naval air power. Their interest has been aroused to a pitch of enthusiasm, and it is infectious, spreading throughout every branch of the Senior Service. We can expect important repercussions from this change in outlook. We can look forward to changes in the Admiralty, to junior officers being required to do gliding courses as they now do boat courses. We can expect a rise in the status of the Navy's air arm, and a good riddance to the airman's view of the salt horse as a pompous prig, and the sailor's view of the birdman as a pushing parvenu. We can expect an influx of

new aircraft that will make the biplanes of yesterday seem like some strange nightmare. And, in line with this, a new type of carrier with entirely new devices for aircraft operation.

For naval air power is in the ascendant.

Two Military Doctrines

Translated and Digested at the Command and General Staff School from a Spanish article by Major Caspar Salcedo Ortega, Artillery, in *Ejército* (Spain) April 1945.

THERE is nothing more difficult than to revolutionize—or simply evolutionize—tactics and things of a technical nature in a place as traditional as the army. The military prophets, the intellectual men of vision, have at all times had to struggle against the lack of comprehension and professional conventionality of their companions who were bound by tradition and who were opposed to yielding to new ideas.

The invention of gunpowder, of the flintlock, of the repeating rifle, etc., brought with them the ruin of tactical methods that had been beyond question up to that time, and therewith, the overthrow of those armies and nations in which they were still in force.

The war of 1914-1918, characterized at the outset by mobility, degenerated into a state of prolonged stabilization in the face of the general employment of a new weapon, the machine gun, which, combined with the particular structure of the Western Front, was to annul all possibilities of maneuver. This and too naive an interpretation of the military art on the part of the staffs of the belligerents led to those bloody and costly frontal attacks which were the essential characteristic of the first European war.

The period of this war which extended through the years 1915, 1916, and 1917 was, on the whole, a colossal and bloody struggle between two coalitions: man supported by the cannon, and the machine gun allied with the terrain and protected by dense fields of barbed wire. In consequence of the superiority of the second of these alliances, there was established a military axiom or principle, the origin of one of the doctrines that we are to try to analyze, namely, that "defense, because of the power of its fire means, is always stronger than offense."

Later on, in the year 1918, a new technical means, the tank, was making its first and victorious appearances. The termination of the war which prevented a definite estimate of the tank, the confusion of the postwar era, false pacifistic ideas, and particularly the professional conventionality we have already referred to, annulled and obscured this medium of action.

Its genesis, moreover, could not have been more simple. Originally, its fundamental principle consisted in placing a shield between the soldier and the bullet. This led to the arming of this armored vehicle (with guns of up to 150-mm) and the transformation of the tank into a means that is wholly offensive, in which movement and powerful fire are combined and mutually complemented. Both of these are characteristic of offense, while the armor which protects the fire means is essentially characteristic of defense.

Thus, the present conflict in its first phase was nothing but a clash between two doctrines; that of those who, blind to technical progress and its influence on war, based their tactics on the aforementioned military axiom, and that of those who had kept abreast of the times, revolutionizing their tactics and shaping them to fit the new means that science had placed at their disposal.

The French Doctrine

The French finished the war in 1918 with an absolute conviction of the superiority of

defense over offense. This superiority was based, as we have already said, not only on fire power, which each day became greater, but on the possibility which existed—with reference to the enemy's traditional methods of attack—of suppressing the flanks of the defensive deployment. In this way, all opportunities for maneuver were eliminated and the enemy would be obliged to resort to a frontal attack.

In their professional conventionality, they ascribed the totality of the German defeat to the heroism of the French Army, which in truth was unquestionable. This army had resisted and forced great battles of attrition on the German Army and had also crushed it from both the material and the moral point of view. The appearance of new means of action had, therefore, accelerated but had not decided the war. It had been decided, they considered, in the years prior to this, as we have stated.

In the minds of their technicians, the war of the future was going to be a repetition or at most an amplification, due to the increased power of means of fire, of the first European War. It was, therefore, necessary to augment the defensive power of their army, interring and protecting both men and weapons. The Maginot Line, fruit of this conception of war, held buried in its deep shelters ammunition, men, and weapons, and, at the same time, two of the fundamental principles of the conduct of military operations—maneuver and initiative.

Defense.—In this category of ideas, the French eulogized the lineal, or rather the frontal, defense. Their defense consisted of a series of positions or lines (advanced, main line of resistance, holding positions), the depth of which was indicated in accordance with the possibilities of penetration of normal infantry units and against which the momentum of the attacking forces was to be broken. These forces—they took this for granted—would be rigid in organization and almost automatic in their action, and would attack in a single direction.

They did not consider, therefore, more than one direction as dangerous—that perpendicular to the front. For although it is true that they established strongpoints and distributed their forces in accordance with the traditional principle of "economy of forces," it is none the less certain that in this organization of positions and distribution of forces there predominated one thought only—that of a frontal attack.

A careful selection of the terrain where their positions were to be established and a well-studied and methodical plan of fire were the basic principles on which their defensive system rested.

Their tactics were those of the dike against the surging waters of the ocean which exert a constant and uniform pressure along its entire length. Waves of infantry were what the attacking formations were called. The advanced positions, which formed a broken line, were like the blocks of reinforced concrete which form the breakwater out ahead of the dike, both placed there for the purpose of resisting and weakening—even at the cost of being overrun—the initial impetus of the pounding of the sea and of the attacking waves. These waves, thus weakened, would then drive head-on against the dike, the position of resistance that had been previously so calculated as to be able to resist and absorb the blow, causing the first waves to rebound, carrying with them the waves which followed them. Lastly, a second dike or holding wall, likewise rigid and continuous, guaranteed the maximum of security to the totality of the defensive organization in the face of the difficult yet always possible inundation of the main line of resistance.

In this manner, the supreme French military chiefs reacted more like technicians than tacticians in their planning and building of the Maginot Line, solving a simple mechanical problem in their calculations relative to the fortifications and their strength.

The problem as stated by them was the following: given the direction in which a force acts (at right angles to the front) and its rate of movement (that of infantry in action), find the resultant striking force,

and, consequently, calculate the resistance of the barrier that at any point will resist the impact of this force.

Pursuing this line of mathematical reasoning, these chiefs failed to foresee that technical progress might increase enormously the rate of movement, an increase which had definite significance in this calculation, even permitting of a reduction of the fire employed. In this way, the striking force built up by the attacker is vastly superior to the cohesion and resistance calculated for the position that is attacked. It breaks in a manner similar to that of a glass which is hard and resistant to a uniform pressure but fragile in case of a vigorous blow.

Lastly, in this defensive system everything was anticipated. The plan of fire, which was carefully worked out and perfected, was based on the fire of the machine gun—queen of the defensive battle and foundation of its development. The artillery and the rest of the weapons reinforced and extended the fire of the first. Therefore, *the machine gun*, principal source of fire, *the telephone*, which makes it possible to put into practice the methodical and carefully worked out plan of fire, and *the concrete*, which guarantees the safety of the men and weapons, constituted the three pillars of this organization which transformed the soldier into a workman, the officer or chief of staff into a functionary, and the general into a factory manager. All of them depended on the second of these elements, the telephone, the importance of which was vital in the interlocked functioning of the position, inasmuch as it connected together the separate departments of this gigantic defense factory.

Thus, the Maginot Line was planned and designed with no regard for new offensive means. It was antiquated before it came into existence, and the contrast between it and the said means constitutes one of the greatest failures of modern military technique.

Offensive.—The French Staff proclaimed, for the year 1939, an offensive doctrine similar to the one announced at the end of the year 1918. The doctrine called for attacks with long and powerful artillery preparation, over fronts of great extension, by waves of infantry and tanks preceded and boxed in by a veritable wall of artillery shells, barrages, and concentrations of fire which were to destroy or at least neutralize the positions to be occupied.

The actions thus planned, the same as those of the first European War, required an artillery deployment with respect to both guns and ammunition, and a concentration of troops and equipment, the logistical as well as tactical aspects of which could scarcely pass unnoticed by watchful aviation. That is, surprise continued to be a mere abstraction, and its place was taken by the brutal concrete element of shock. The tank accompanied or slightly preceded the infantry, but always shaped its progress in accordance with that of the latter, constituting thus an accompanying arm at the service of the infantry.

As can be seen in this doctrine, which follows naturally from the previously analyzed doctrine of defense, it is taken for granted that the necessary time will always be available in which to effect the artillery deployment and the concentrations of means. That is, it generalizes the attacks on positions that have long been stabilized, concentrating forces and preparing for offensive action under the protection of the powerful barrier built and equipped for this purpose and which has already imposed a first period of losses on the enemy.

German Doctrine

Since Clausewitz' time, the battle of Cannae has constituted the supreme ideal of German tactics. Schliefen, in his plan, attempted to envelop, by means of a broad sweep of his gigantic right wing, the entire French Army. Moltke, when his maneuvering wing was weakened, was stopped at the Marne. The drive to the sea was his last attempt to effect, at any cost, the desired maneuver. When this attempt failed, the Western Front became stabilized.

The first milestone of the future German tactics was placed in Ludendorff's offensive of the year 1917. We find here infiltrations, by means of special or shock detachments, through the enemy's defensive system. These detachments, protected by smoke screens and gases, preceded and opened the way for the infantry units. The artillery preparation, which inevitably preceded every attack—although of a violence and intensity much superior to that of previous years—was of much shorter duration. As we see, the effort was made, although as yet with timidity, to recover again the element of surprise, which had been utterly ignored during previous years. The failure of their offensive as a whole in spite of unquestioned local successes, the experience of Cambray, Mangin's counterattack, and above all, the British attack of 8 August, named by Ludendorff the day of sorrow of the German Army, definitely opened the eyes of the German General Staff. Before them had appeared the means which permitted the rapid crossing of defensive barriers, reestablishing and revindicating the so greatly desired maneuver in the open terrain.

The political climate of the German National Socialist movement and the reorganization of their old Army were to be favorable for the cultivation and development of the doctrines of Guderian, thus beginning a new chapter in the history of the art of war.

It is to be noted that, in this case, tactics, properly speaking, do not undergo an entire revolution in the face of these new means of action. On the contrary, it is these means that renders possible the reestablishment of old tactical ideas in which the machine gun had exaggerated the concept of the defensive.

Offensive.—The German doctrine is summed up in the two words that are now famous throughout the entire world: "blitz offensive." Its fundamental tactics are those of infiltration and its principles those of Clausewitz, brought up to date and modernized by modern means of action.

At the outset, this doctrine, born as a reply to the French defensive doctrine, commits thte error of going to an extreme in ignoring classical procedures almost in their entirety. At the present time—now that equilibrium has been restored between the two types of operational procedures—its suitability and its possibilities constitute the patrimony of the great military chiefs.

Its operation is the same in the case of both small and large units and may be summarized in these three concepts: *breakthrough, envelopment,* and *deepening of the thrust*; and the basic factors back of the blitz offensive are also three in number: *surprise, speed,* and *superiority* with respect to *men, matériel,* and *fire.*

Surprise, an indispensable factor in any war and which, for the reasons already explained, had been ignored in the war of 1914-1918, has again become possible now that motorization has attained its prime. In the face of the mobility and efficiency of these means of transportation and combat, the need has disappeared for concentrating men, ammunition, and guns at the desired location months in advance, and it is possible to carry out elastic concentrations at great distances from the front, which in this way are normally unnoticed by the enemy and which, in any case, leave the enemy in the dark with regard to the sector to be attacked.

Thus the old military proverb, "March separately and attack together," again becomes possible.

Speed, the second of the factors named, is the indispensable complement of surprise, since without it the initial success cannot be exploited in depth. That is to say, the defense system that has already been cracked but not yet destroyed and the pillars of which must be broken before it is able to react and repair its broken front, so to speak, by the help of strong reserve forces, is not disorganized.

The war of 1914-1918 was nothing but a series of offensive actions successfully begun but in each case frustrated through lack

of speed on the part of the attacker who, as if by decree of fate, moved his forces more slowly than the reserves of the enemy previously concentrated in the sector where the attack occurred, for as we have said, no attention whatsoever was paid to the factor of surprise.

The third of the principles named is represented by local but crushing superiority on the field of battle, a superiority maintained at all times owing to the possibility of rapid concentration of motorized and mechanized elements, to say nothing of aviation, the concentration of which on the field of battle is immediate.

Summarizing, we may say that these three factors are always obtained in case of the employment of motor vehicles as a means of transportation, armor as a combat means, and aircraft as a means of support, liaison, and protection.

In this way and with the advent of this new doctrine, because of the employment of the new combat means which permit us rapidly to obtain local superiority, maintain secrecy with regard to our intentions, and guarantee surprise, it becomes possible to break through the entire depth of defensive positions as if with blows of an axe. Thus, there is no need, felt in previous years, of launching an attack over a great front, the only method possible in those times of effecting a breakthrough. Once the necessary breach or breaches have been effected, armored and motorized means, making the most of their basic characteristics of power and speed, rapidly search out the heart and nerve centers of the enemy in order to paralyze his brain, his organs of command.

Hence, this new mode of operation does not require frontal deployment of manpower and artillery but deployment in depth along the highways which today more than ever are the indispensable axes of all movements. In this manner, the reserves not only feed or repeat the attack but can be employed rapidly, by virtue of their mobility and a skilful employment of communication routes, to create new centers of pressure in the attack, constantly varying the direction of main effort and feeling out the front in order to discover weak spots where they may effect a breakthrough. When this has been accomplished, simultaneously with the rapid advance of some of the units into the interior of the position, others pounce upon the enemy dispositions from the rear, thus widening the initial breach and at the same time increasing the strength of their flanks to prevent their being choked off. There is created thus a series of large and small tactical pockets which must later on be reduced and mopped up.

The success of this new offensive doctrine is attested to by the campaigns of Poland, France, and Greece, and those of France and Russia waged by the Allies who have adopted the foregoing doctrine. In both instances we see mechanization and the radio triumphing rapidly over the machine gun and the telephone.

Defensive.—German strategy, in consequence of her central position, varied in its expression between two different concepts: attacking the stronger or the weaker of the coalition that she was doomed sooner or later to meet.

Having failed in the first of these concepts in the war of 1914-1918 in her attack on France, she was moved in this second European War to act in accordance with the second, that is, to attack the weakest of her enemies—in this case, Poland.

And in pursuance of this idea and in the face of the impossibility, from the standpoint of strength, of carrying on a double offensive, the Siegfried Line, constructed along her western frontiers, was not, like its French counterpart, an exclusively defensive barrier but one which served the double purpose of guaranteeing liberty of action for a certain time to the main body of her forces located on the Eastern Front and of serving as a jump-off for these forces as soon as the fighting had been terminated on that front.

As we see, the Germans, essentially, do not possess any defensive tactical doctrine since their concept of defense is completely strategic. It is on this account that we have

the deep echelonment of their defensive positions and the discontinuous line traced by them, a veritable offensive deployment, sunk in the earth, which because of circumstances is compelled to shift to the defensive.

The German doctrine of defense—that is, articulated or elastic defense—saw the light subsequently on the battlefields of Russia, owing to the impossibility of successfully terminating the blitz offensive begun there. This impossibility, veritable complex of space and weather, first brought about the halt of the German Army and then the adoption of a defensive deployment.

Out of this initial forced deployment and the particular circumstance of having, to the rear, an expanse of foreign soil of no vital import to the German nation, was born the idea of elastic defense, as a lesser and unavoidable evil in the face of the offensive power of Russia, yet unacceptable in the majority of cases as a defensive doctrine in the case of nations initiating hostilities under normal conditions.

The basic factors in this modern concept of defense are invisibility, depth, and speed of action.

Invisibility is a principle that is difficult to observe in practice (concealment by natural or artificial means), by virtue of which the effort is made to escape detection by the enemy as much as possible.

Depth of deployment is an indispensable condition imposed by the speed and power of the offensive means. This depth, combined with the discontinuity of the structure of the defensive position, aims at controlling the course of the enemy's penetration and at weakening it progressively. That is, in the face of the impossibility of preventing the breakthrough of the front, the latter is presented to the enemy already broken, or at least articulated, with strong hinges or pivots destined not to yield as previous positions had at the impact of the attack, but to hold at any cost. Recourse is had, therefore, to the artifice of preparing weak sectors destined to yield at the impact of the enemy attack, thus controlling the course, almost planned in advance, of the enemy advance, imposing thus, as if by rebound, our will on the enemy, making the effort every moment to ensnare the attacker in our defensive network.

It is necessary, therefore, to organize these key positions in such a way that they will be able to continue to resist even when passed, their neutralization or capture requiring, thus, considerable effort and heavy losses on the part of the enemy. Organized in this manner, these centers of resistance, even though separated from one another, are joined by means of other smaller and weaker positions. As a result, the front appears continuous and strong. The plan of fire, more complex and less methodical than in the case of the foregoing defensive conceptions, is not the key of the defense as in the case of the former, but the basis and support of the offensive reactions which, combined with vigorous initiative, constitute the essential characteristic of this defense. In this way and in the face of the necessity that these positions continue to exist in spite of being passed by the enemy, there has come into existence, in their organization, a defensive and active radial concept. That is, there have come into being the so-called "hedgehog" positions which include in their perimeter not only troops and weapons charged with their defense (their normal garrison) but also weapons and reactionary means that are eminently offensive in their nature. These means, with the support of these positions, allow of active defense, based on speed of action.

Speed of action requires not only previously worked-out coordination of fire means, but also mobility and speed on the part of the means of reaction, at least equal to those of the enemy, and an amply developed spirit of initiative. Thus, actions or reactions will be produced against the rear and flanks of the enemy. Strong counterattacks developed *in situ*, based, as in offense, on infiltration and opportune employment of armor, will attempt to cut off, as if with the blows of an axe, the

attacking arms or points in order thus to create the tactical pockets which later on are to be cleaned up or reduced.

As a brief resumé of this summary analysis of the doctrines in force in the second European War, we may set down the following conclusions:

First, that the old concept of static defense has been melted in the crucible of war and that, in the face of modern offensive means, there exists no other than elastic or articulated defense.

Second, that in the face of efficient combination and skilful employment of all offensive methods, there exists at the present time a crisis in defense.

The Russian Offensive of January 1945

Digested at the Command and General Staff School from an article by Captain W. R. Young, Royal Artillery, in *The Fighting Forces* (Great Britain) April 1945.

THE Russian operations which were set in motion in January 1945 will without doubt take a supreme place in military history, for in them we will be able to trace a clear record of the rapid triumph of one well-trained, well-equipped, and well-directed army over another army similarly endowed. It has been a triumph of superior numbers, it is true, but superior strategy has had something to do with that and, anyway, who would expect to be victorious in the offensive except with superior numbers?

This article will not attempt to appraise the whole vast picture of the campaign but will endeavor to pick out a feature here, an episode there, in the story of the operations which seem to embody illustrations of and lessons in the ever-developing technique of the craft of war.

Perhaps the most startling thing about the offensive which Marshals Koniev and Zhukov launched in January was its immediate and decisive success. There was no surprise, in the ordinary military sense, about the assault, for the Germans were expecting it and guessed correctly that it would start from the Sandomierz bridgehead and from the two smaller bridgeheads on either side of Demblin (see sketch); yet it took Koniev only two and Zhukov only three days to make a clean break through the defenses which had repeatedly baffled the Russian armies in July and August. And those defenses had been elaborated and strengthened during the five months which had elapsed since the summer.

The Russians attribute the success of the break-in to their "artillery offensive," and we must accept this explanation without argument, especially since their attack was launched without any of that massive air support which, in so many instances, confuses the issue. It will be appropriate, therefore, in our study of the craft of war, to take a brief look at this "artillery offensive," if only in its opening phase.

The distinctive features of a Russian opening bombardment are:

1. Its brief duration.

2. The inclusion of all kinds of weapons, down to small-caliber antitank guns, in the army broadside.

3. The extensive use of direct fire from the lighter guns.

4. The policy of allotting individual targets to individual units.

Discussion of these features could take up pages but here it will be confined to the following comments:

1. A short opening bombardment aids surprise. Its aim, moreover, is destruction, and destruction caused in the last two hours before the assault cannot be made good.

2. There are a great many antitank guns in a modern army and only a few of them ever function in their primary role. So it is sound policy to find an alternative task for

them. Otherwise they are so much dead material. Besides, these guns, with their flat trajectory, can put shells straight into the embrasures of pillboxes, which is a thing that field howitzers can seldom do.

3. Direct fire methods are only possible in certain conditions of visibility and terrain. They cannot, for example, have been used when Koniev's infantry crossed the Czarna at five o'clock on the morning of 12 January.

4. A policy of parceling out the known targets among the available batteries—which is merely the "battery zone" system of the last war—saves a lot of time and makes for more effective shooting. For instance, if sixty targets are divided between six four-gun batteries, each target can be given at least ten minutes' methodical shelling in the course of a two hours' bombardment; but if a centralized "battery" of twenty-four guns is switched on to each of the sixty targets in succession, it can give each target less than two minutes' shelling within the two-hour period—and that shelling is unlikely to be very methodical.

It should be noted, however, that the "artillery offensive" is no new thing, for it has been a fundamental part of the Red Army's tactical doctrine since Stalingrad.

A Russian characteristic of a more general nature, however, is to be found in the broad fronts on which all the operations of the Vistula offensive were conducted. This again is merely a culmination of a trend which has been developing since 1942, for it was in that year that the Russians began to query the doctrine of the blitzkrieg school which advocated "concentrating overwhelming force on a narrow front." An article in a Red Army newspaper even suggests that "single line deployment" should replace "echeloned columns" in the attack, and it points out (1) that only the line formation enables the attacker to bring all his fire power into play simultaneously—which is a very ancient argument; (2) that the rear columns in a narrow-front attack, though unable to take an active part in the battle, often suffer very heavy casualties from the enemy's artillery and aircraft.

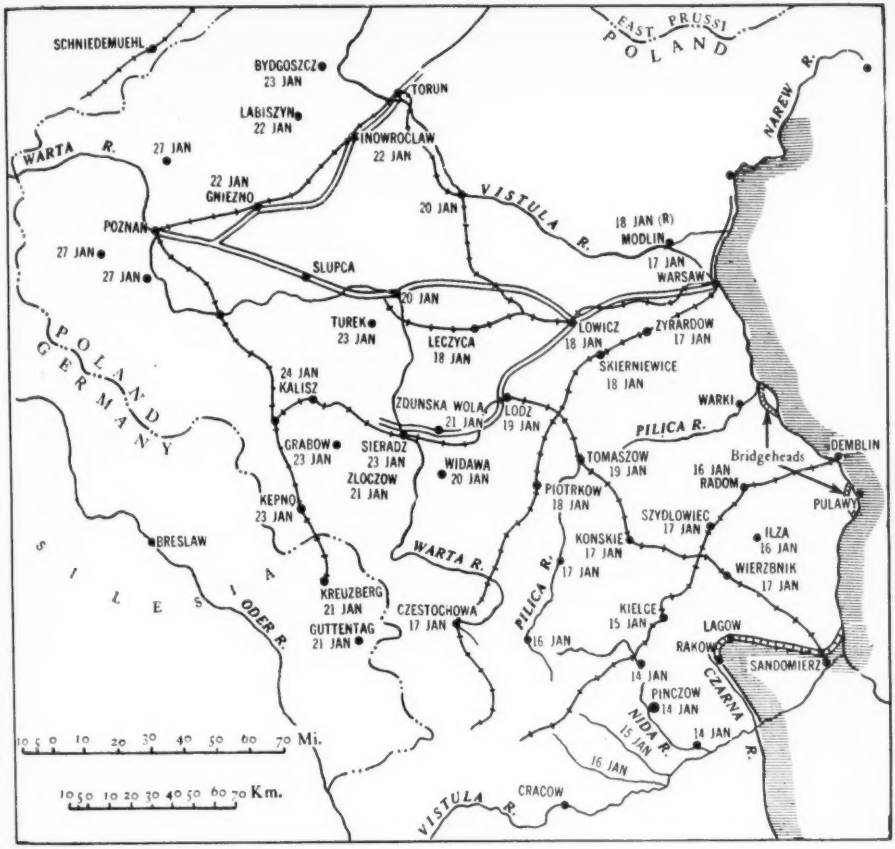
To these we may add that the broader the front of the attack the greater will be the numbers of the defenders who are kept occupied and are forced to react to the movements of the attacker.

On the Vistula, Zhukov, having inherited only a small foothold across the river from the summer's operations, had, indeed, to start on a narrow frontage; but it was through *two* bridgeheads that he made his thrusts. Rokossovsky, likewise, made his breakout from the Narew line through *two* bridgeheads. But Koniev was able to show his preference for a broad front more plainly. His Sandomierz bridgehead was shaped like a cone with its apex truncated by an eight-mile line, from Lagow to Rakow, which fronted westward. Rather than start his offensive through this bottleneck, Koniev struck first in a southwesterly direction from his line on the River Czarna on a frontage of twenty-five miles. It was not till he had reached the Nida, thirty miles ahead, that he "formed front to a flank" and advanced northwestward on a thirty-mile front to take Kielce.

Later we find Koniev crossing the Silesian border on a sixty-mile front on 21 January, and two days later his troops were ranged along thirty-seven miles of the Oder bank. Rokossovsky, also, invaded East Prussia on 21 January on a fifty-mile front and then extended his right flank another sixty miles to the east. It must be stressed, moreover, that all the cases quoted are examples of *initial assaults against prepared positions*, not merely of fanning out after a successful breakthrough.

The invasions of Silesia and East Prussia both occurred on the same day. This exemplifies the broad front on the strategic scale.

The breakthrough on the Zhukov-Koniev front was complete by 16 January. By the 17th it was clear that the Germans were conducting a retreat from the Vistula theater; for the evidence of Kielce, Radom, Czestochowa, and Warsaw, none of which produced



any great haul of prisoners, could not be ignored. And this time it seems that the German retreat was really according to plan in its original conception. How subtle and far-reaching that conception may have been is an interesting speculation, but the plan itself seems to have been simple enough—a withdrawal at maximum speed as soon as the Vistula defenses were broken. Such tactics of elusiveness, leaving the enemy striking blows in the air and advancing with all caution in expectation of a trap, can be very effective in depriving the victorious army of the fruits of its victory. But in January 1945 they failed, for the Russian armies immediately adjusted their tactics to meet the new conditions and flooded over the Polish plains like a torrent. The broad fronts of the initial breakthrough were extended to north and south till they filled the whole space between the Vistula and the upper waters of the Oder in Silesia, and the pursuit was conducted with such vigor and speed that any plans which the Germans may have had for delaying actions on the river lines which crossed the axes of their retreats were

forstalled. Koniev, in his drive for Cracow, forced the Nida on a thirty-seven-mile front on 14 January, and he crossed the next two streams which barred his way on the 15th and 16th. In his westward thrust for Czestochowa he forced the Pilica on a thirty-mile front "preventing the enemy from organizing a defense on it"; and he seems to have had no difficulty with the Warta, a little farther on.

Zhukov's left wing seems to have been somewhat delayed by the last-named river near the town of Sieradz, but as other columns were thrusting ahead on north and south, the Germans at Sieradz must soon have seen a pocket forming.

Many pockets must, of course, have been formed, since the pursuit was conducted by a number of columns on parallel lines. But on the whole the Germans seem to have managed to avoid any major encirclements in the early stages of the retreat. But if this carries a suggestion that the German plan was a success, a glance at the statistics of German losses in the first thirteen days of the offensive will provide a wholesome corrective.

We may conclude that the German plan of retreat was defeated by the readiness with which the Russians changed over to the proper tactics for pursuit and by the speed with which they pressed that pursuit. That speed naturally varied according to circumstances, but Zhukov averaged nineteen miles a day over more than a fortnight, and Koniev, who was early involved in stiff fighting in Silesia, averaged twelve.

The Germans, however, did derive comfort from the fact that in January they suffered nothing like the series of disasters which had marked the early days of the Russian summer offensive. Guderian, in an order which fell into Russian hands, refers to those catastrophes in July when "whole formations, divisions, and corps" had been captured, and points out that the new defense tactics of "wandering kettles" was proving more successful. "Don't be afraid," he tells his troops, "of abandoning territory. The High Command is working in accordance with a precise plan"—which is important evidence of a deliberate retreat. But Guderian went too far when he prophesied that the "feats of daring" of the Soviets would be stopped by "a mere handful of men" within a week. In fact, the early "successes" of the mobile tactics were largely illusory since the Soviets were deliberately carrying out a policy of driving deep before turning in. There must have been quite a number of "kettles" wandering westward, not only ahead of, but also in line with and behind the Russian spearheads. But the pursuers had eyes only for the "kettles" in front, for the rest were already being dragged along in bags and could be sorted out at leisure.

It is not, indeed, till the last days of January that we see a convergence of Soviet columns on either side of Poznan, and on the 27th the circle round the city was complete. The count of prisoners at the capitulation, four weeks later, was 23,000.

A large part of the article has been taken up with an examination of a pursuit and, since pursuit is a very important branch of the craft of war, no apology is offered. Whether this particular pursuit can be regarded as a textbook model, it is, in view of our limited knowledge, too early to judge, but there can be little doubt that the full record of it, when written, will be a most useful reference book on a subject which few armies or commanders have mastered.

And yet, after all, this 300-mile drive from the Vistula to the Oder is only an incident in the history of the Russian winter offensive of 1945.

Attack Planes in Action

Translated at the Command and General Staff School from a Russian article (editorial) in *Krasnaia Zvezda* (Red Star) 11 January 1945.

ATTACK aircraft are one of the principal auxiliaries of the Red Army in its battles and operations. As a rule, the efforts of attack aircraft, the fundamental mission of which is the support of ground forces from the air, are concentrated in the decisive direction. In their cooperation with the ground forces, the Stormoviks are used primarily for attacking the enemy's tanks and artillery, both on the battlefield and on the approaches to it.

The operational and tactical employment of Stormoviks in the interest of ground forces is based on two fundamental forms of action: concentrated and echeloned. The aviation commander, choosing one or the other of these methods and at the same time considering his effective forces, makes his plans in conformity with the mission assigned the Stormoviks.

In cases where it is necessary to attack strong enemy armored groups or break up an enemy counterattack, a concentrated blow by the attack aircraft is advantageous. Its value lies in the maximum concentration of fire on a limited number of objectives. Such an attack results not only in material damage to the enemy but also in his moral impairment. But when the mission of the Stormoviks is protracted action against the enemy, echeloned attacks prove more expedient. In delivering these blows, the attack aircraft operate in separate groups and attack at irregular intervals, making several runs at the targets.

Success of Stormoviks is assured by their massed employment and the element of surprise. The commander, however, must bear in mind that the success of an operation is not determined by the number of sorties flown or the amount of ammunition expended, but by the manner in which the assigned mission is accomplished. The infliction of maximum damage on both the manpower and matériel of the enemy—this is the requirement that is made of the Stormoviks. This depends, to a considerable extent, on a correct choice of means and mode of action.

Attacks in grazing flight constitute the basic mode of action of the Stormovik. The experiences of war show that this method of flight insures surprise in attack, decreases losses caused by the enemy's antiaircraft guns, and excludes the possibility of counter-attacks from below by enemy fighters. The employment of grazing flight at all times and against all objectives, however, would constitute the blind following of a fixed form. Various types of targets may be encountered. Some of them as small and well-concealed targets, for example, should be attacked by climbing to moderate heights —100 to 300 meters—making use of grazing flight for the approach. In the same way, in many cases, various objectives may be attacked from a glide or bombed from level flight at low altitude, depending on the situation.

The accomplishment by Stormoviks of any given mission involving concentrated or echeloned attack depends on the proper action of each group of planes and, within each group, of each individual crew. This is why, in the preparations for a combat flight, it is very important that there should be a thorough study made of the mission down to a detailed schedule of every flight, in which the methods of attacking the various objectives, the system of observation, the signal communication, and the fire and maneuver of each crew and group are carefully worked out. In this schedule there must be established in advance the form of action to be followed in the attack under all possible conditions. Careful preparation for the Stormovik attack insures the punctual arrival of the various groups over the target area.

Sudden and accurate sorties—with regard to time and space—are prime fundamentals

of the success of Stormovik attacks. At times, however, the commander of a group of Stormoviks, in order to achieve surprise, may resort to a maneuver which will affect the punctuality of the blow. It should be kept in mind that surprise in Stormovik attacks is to be regarded as a means for obtaining favorable conditions for delivering the blow and for reducing the effectiveness of antiaircraft weapons of the enemy. For this reason, any effort for assuring surprise must not interfere with punctuality in the time of reaching the objective and its destruction. The commander of a group should strive for both surprise and punctuality of action. This is especially important in case of cooperation with ground forces. Here, any delay or anticipation whatsoever in the attack of the Stormoviks is absolutely inadmissible.

The Stormoviks attack the enemy in close cooperation with the ground forces. During the fighting by the infantry and tanks for the possession of the main line of resistance, attack planes should be over the battlefield for a period of two or three hours. By their attacks on the enemy's tanks, artillery, mortars, and fighting forces, they fulfil their mission of securing the advance of the infantry and tanks.

This war has shown that the constant presence in the air of small groups of Stormoviks is indispensable in the maintenance of maximum tempo of movement when mobile forces are committed in the breakthrough. These groups, out ahead of the mobile forces, search out and suppress the enemy's antitank weapons, and especially his antitank artillery. On the battlefield, the attacking Stormoviks are usually echeloned. They operate in groups, the composition of which is determined by the mission and the air situation. A considerable effect is produced by protracted and repeated action upon one and the same objective.

Targets may be attacked from the flank, front, and rear of the enemy. Flank attacks are employed in operations against personnel in trenches, provided our own forces are not endangered by the fire of the Stormoviks. Frontal attacks are employed against enemy emplacements located close to our trenches. In this case, the most advantageous route for pulling out and returning is indicated in advance. Attack from the rear insures the greatest surprise, but in this case, there exists the danger of hitting our own forces. These attacks, therefore, should be made only on targets located at a safe distance from our troops.

Embarkation for Normandy

Digested at the Command and General Staff School from an article in *The Army Quarterly* (Great Britain) April 1945.

THE first phase of movement in the invasion of Normandy consisted of the assault and immediate follow-up; and the second phase, the build-up. It may be of interest to describe, in some detail, from a Movement Control angle, the events which occurred at one particular British port between the arrival of a unit in the marshalling area and its embarkation during the build-up.

For the first phase, the assault craft were allocated in ample time and the troops and vehicles were pre-loaded over a number of days before D-day. Landing tables and stowage plans were prepared by the assault brigade groups, and these formed the basis for the loading tables produced by Movement Control. The build-up is dependent on returning landing craft and ships, and Port Movement Control received movement forecasts from higher authority three days prior to the dates of embarkation. These forecasts were subsequently amended as necessary to comply with the Force Commander's changed requirements, resultant on the progress of the battle. The forecast gave details of units, vehicles, guns, etc., the number and types of ships which were expected to be available, and the date of embarkation. This

was later confirmed as a definite movement table. On receipt of this, the final planning of the lift began.

Shipping conferences were held at Port Movement Control twice daily to discuss berthing arrangements and times of commencement and completion of loading of each vessel in accordance with the naval forecast of ships likely to be available.

Whereas the tactical loading of the assault force resulted in an accepted waste of space, this consideration did not arise in the build-up, and it was essential to waste no space and so economize in shipping. To achieve this result, models of ships' space—showing obstructions on the decks—and models of each type of vehicle were used. There were over 1,600 different models. The vehicles, guns, etc., were jigsawed into positions that gave the maximum lift per ship or craft. The space required to maneuver the vehicles into position was important. Correct overall measurements, weights, and particularly heights were essential, and from time to time much inquiry was necessary when a new type of vehicle was encountered.

To fit the vehicles in, a high standard of driving was required and attained. A driver, controlled only by a guide using hand signals by day and dimmed torches by night, had to be capable of driving his tank or lorry in reverse through a water splash, up a steep ramp, and on to the craft. Once aboard, the vehicle had to be got into its allotted position with little or no space to maneuver. In the earlier stages of training, much value was obtained by using mock-ups of landing craft complete with ramp and water splash constructed on land.

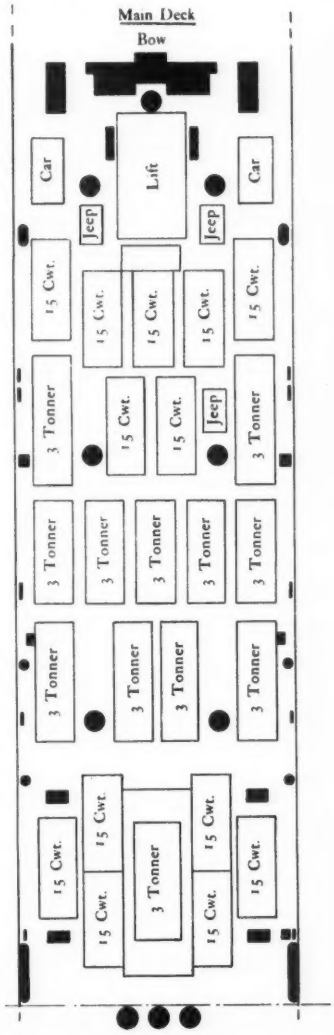
On some occasions, at the last moment, a new unit was inserted by the Force Commander and given No. 1 priority. This usually meant replanning the whole of the day's lift and resulted in the "shutting out" of a low-priority unit or units of equal bulk. Once it was necessary to replan the whole of seven Landing Ship Tanks (LST's) three times in twenty-four hours. Always the planning of loads was done against time and at high pressure.

STOWAGE PLAN

L S T II No. _____ DATED _____

O C TPS _____

UNIT _____



Personnel other than vehicle parties were lifted in personnel ships and craft, and times of arrival at the Road Convoy Regulating Post (RCRP) berth, times to commence and complete loading were given in the tables.

The plans for the lift for any day were issued as loading tables, and each ship or craft was allotted a serial number. The vehicles were enumerated in the order in which they were to be embarked. This was also reflected in ships sheets and unit sheets for use in the marshalling areas. The information was sent to the marshalling area concerned in manuscript as quickly as possible so that they could shuffle units into appropriate ship loads, and mark vehicles with chalk on the mudguard or other suitable place, giving serial number of ship and order of loading. A ship might have part of a large unit or several small units. Clerks often worked throughout the night preparing the tables which were then cyclostyled and distributed to addresses by special DR's.

A stowage plan was prepared for each ship and issued to the Embarkation Staff Officer (ESO) at the hards showing the exact position to be occupied on board by each vehicle and the order in which vehicles were to be loaded. The order of loading was important to ensure sufficient vacant space for maneuvering on board. (See sketch, page 117, showing stowage space and obstacles on the main or top deck of an LST.)

As and when information was received from the Principal Hardmaster that ships should be due at various hards at certain times, the shiploads were called forward from the marshalling area to an Embarkation Regulating Park (ERP) near the hard at which they would embark. This was done by Control at the port. The loads remained in the vicinity of the hards until the ship was known to be in the offing, and were then called down on to the hard itself. The position of each shipload, from the time it reported at the RCRP until it was actually embarked, was shown on a tab hung on a large board in the Control Room at Port Headquarters, and the precise position of any load was always available.

The golden rule was never to keep a ship waiting, and it is gratifying to note that no ship ever did wait for its load.

It was unevitable that snags would arise. Units arrived from time to time with more vehicles than had been notified, or with different types from those indicated. When the changes were to smaller vehicles no problem arose, but when they were larger another headache occurred. Marshalling areas will recall this snag vividly. Occasionally, vehicles with height incorrectly marked would exceed the maximum height which could enter the tank deck of an LST. If only an inch or two in excess, tires could be partially deflated, otherwise the outsize vehicles were "phased out" and loaded elsewhere in landing craft—where height was not a consideration.

The representative of the force which was being embarked, who was attached to Port Movement Headquarters, rendered valuable assistance in the "breakdown" of large units which required more than one ship to transport them. It would be unsound to split a unit into unworkable parts, or to divorce essential vehicles and equipment from their sections, batteries, or companies, and this officer obtained the correct answers to these and many other problems. Unit commanders or their representatives calling at Port Headquarters often provided invaluable liaison.

Occasionally, unit and other officers, on arrival at the hards, had different ideas on the order and method of stowage, but the tact of the ESO's in charge of the hards and all loading overcame this difficulty, and embarkations were completed to plan. One waterproofed vehicle not under control owing to a sudden failure careered down the sloping hard and was totally submerged. The headlights continued to burn for three-quarters of an hour—a tribute to its waterproofing.

The proof of efficient documentation of personnel and vehicles was forthcoming on several occasions. Officers or men, recalled on compassionate or other grounds after em-

barkation and departure to the naval assembly areas prior to joining sailing convoys, were identified and disembarked by launch from their ships and despatched to their inland destinations.

Simultaneously with this British movement of men and vehicles to the far shore (1) the United States Army was moving large forces of troops and vehicles through the port; (2) thousands of tons of stores of every description and thousands of railway engines and wagons were being loaded; (3) disembarkation and entrainment took place of (a) thousands of prisoners of war, (b) British and U.S. casualties, (c) returning airborne troops, and (d) allied nationals.

The British and United States Armies worked in the closest touch throughout the whole operation of movement, marshalling, and embarkation and each helped the other with such good will that all difficulties were overcome. The teamwork achieved will long be remembered.

Carrier-Borne Fighters

Translated and digested at the Command and General Staff School from an article by Air Captain Manuel G. de Aledo in *Revista General de Marina* (Spain) January 1945.

IT has been proved conclusively that a fleet's own fighter force constitutes its best defense against aircraft, since it is by this means alone that it can gain supremacy and, eventually, complete control in the air. Any naval force must therefore include an adequate number of carrier-borne fighters which will serve as the basis for its antiaircraft defense and which will be supported by whatever other means are available. The problem of carrier-borne fighters may be divided into two parts: one is the type of planes which will be used for the mission, and the other is the type of ships which will transport the fighters themselves. Great importance must also be attached to everything pertaining to the selection and training of personnel for the air units.

A good carrier-borne fighter must have all the following: a very high speed, maneuverability, a wide cruising range, and a very low stalling speed.

High speed is most important in aviation because on it depends success against any onslaught by enemy aircraft. At present those planes which are the greatest threat to naval formations are the torpedo-carriers. Fighter planes are the most efficient defense against this or any other type of attack, and their effectiveness goes hand in hand with the speed which they are able to develop.

Fighter craft must possess all possible maneuverability at high altitudes, compensating with this quality for whatever they may lack in other respects (armament, speed, flying altitude, etc.). It is essential that the carrier-borne fighters be capable of a high rate of climb so they can reach the necessary altitude in the shortest possible time, thus reducing the enemy's advantage of surprise gained by the tactical advantage of altitude.

Cruising range becomes very important on the high seas. Land fighters generally have a short cruising range, a characteristic which may be subordinate to other more vital requirements. In the case of carrier-borne fighters, however, cruising range is of primary importance, for they have to be able to fly the longest time possible. This does not mean that the fighters should remain constantly aloft in order to secure that control of the air which is essential for the fleet's safety. Because of the toll it would exact in personnel as well as the logical shortcomings of the planes themselves, it is impossible to keep a large number of planes continually aloft. Therefore, the commander of the naval force must estimate the importance of the missions to be accomplished with a view to concentrating upon the most suitable positions; and it requires that he should have a thorough knowledge of aviation from which he will be

able to tell at all times what he can expect of each of his units. Besides this knowledge, which is a prerequisite for command, he should have the advice of a competent air chief who will be able to give him information whenever he may require it. Nevertheless, at times it may become necessary for an entire fighter force to remain aloft for a prolonged period. It is at such times that the long cruising range of the planes can be of great advantage.

A low stalling speed is necessary for taking off and landing within the limited space on the decks of carriers.

The trend towards using land fighters is due to unsatisfactory results with seaplanes. This is what imposes the use of carriers for transporting aircraft rather than any other type of vessel. We use the term "aircraft" instead of "fighters" because some reconnaissance planes may also be carried, though most will be fighters. That these are the only two types of planes generally used on carriers is due to the greater cruising range which bomber-type aircraft have, which in most cases allows them to operate from bases along the coast when they cooperate with naval units. Space is a real problem on the carriers, and by eliminating the bomber type of craft from their decks a considerable saving is effected for fighter and reconnaissance craft. Then too, the missions which fighters and reconnaissance planes have to perform are generally on shorter notice, which makes it more convenient for the commander to have them near at hand.

The problem of space on board the carriers brings us to the types of naval craft to be used. We may expect that this problem will become more serious in the future, the Achilles' heel of the carriers being their great vulnerability due to the size required for flight decks. There is reason to believe, however, that the tendency will be to reduce the size of the ships themselves.

At present the tonnage of aircraft carriers may range anywhere from the Japanese *Ryuzyo's* 7,000 tons to the U. S. S. *Lexington's* and *Saratoga's* 33,000 tons. The length of the runways used for the take-offs determines the carrier's tonnage and its possibilities. In order to facilitate landings without increasing the carrier's weight, with a given runway, the vessel's speed as well as the velocity of the wind may be brought into play. A smaller flight deck requires an increase in the speed of both wind and ship. Technicians have sought to solve this by providing the carrier with a wind tunnel in which the velocity is increased by reducing the size of the tunnel. It is estimated that air currents having a velocity between sixty and seventy kilometers an hour may be obtained. With regard to the take off, the solution may be found by using catapults or rolling treadways to hold back the plane while its motor is getting up flying speed and which will reduce very considerably the space over which the plane has to run. These or other solutions will have to be adopted in order to remedy the aircraft carrier's great vulnerability.

The principal missions of carrier-borne fighters are the following:

Protection against enemy bombing during daylight and at night.

Destruction of enemy reconnaissance planes.

Escort and protection of offensive squadrons in daylight operations.

Convoy protection.

Attainment and preservation of that control of the air which is indispensable for all types of combat operations.

Heavy Tanks in Marches

Translated and digested at the Command and General Staff School
from a Russian article by Lieutenant Colonel P. Velichko in
Krasnaia Zvezda 14 November 1944.

A correctly organized march and its successful completion assures the timely commitment of tank units. Our heavy tank regiment, cooperating with medium tanks, carried out a long movement on one sector of the front, during the course of which we were obliged to move over areas of varying passability and to carry on combat at the some time. Let us endeavor, on the basis of our experience, to make a few deductions relative to the organization of tank movements.

Experience has shown that, on the march, the speed of heavy tanks is often less than that of medium ones. What are the reasons for this and what can be done to remedy the situation?

The main difficulty here is the location of the heavy tanks in the march order of the unit. As a rule, heavy tanks act in battle in the rear of the medium ones. When enemy tanks and self-propelled guns appear, they move ahead into the battle formation of the medium tanks and take up firing positions in order to destroy the enemy's armored vehicles by firing from stationary positions. Naturally, they fire at greater ranges than the medium tanks. On the basis of these considerations, heavy tanks are assigned a position behind the medium ones in the organization of a march column. It is well known that the rate of movement of the two types will be different—the fact that the heavy tanks will be obliged to travel over a road that has already been damaged by the machines ahead of them being a factor that will make itself especially felt.

Even when the terrain of the march route is entirely passable for tanks, still the heavy tanks in the rear of a column will always encounter a number of difficulties that will decrease their speed. Thus, for example, in the approach to an inhabited place, the heavy tanks of the advance elements crossed a stream on the approaches to the village without difficulty. But when the turn came for the tanks in the rear of the column of the main body, it became necessary to reinforce the bank of the stream, which had been torn up by the crossing of the medium tanks ahead of them. Part of the heavy tanks were able to cross only with the help of other tanks and tractors. Naturally, if the heavy tanks had been traveling at the head of the column or independently, the crossing would have required much less time. And, as a matter of fact, there was no small number of rivers and streams on this route.

Another reason why heavy tanks lag behind is that the servicing of these machines on the march is considerably more complicated than that of medium tanks, especially when the march is being conducted over sand or dusty roads. The time spent in the servicing of heavy tanks on the road often exceeds the established norms.

It is necessary to give careful thought to the actual conditions under which a tank is operated and on this basis calculate the time required for the work of the crews. The first halt must be made, not at the end of an hour, but at the end of thirty minutes of travel. This should be a thirty-minute halt. If the road is sandy or dusty, subsequent halts must be made every two hours. The duration of these halts should be from one and a half to two hours. It is not difficult to show a basis for these norms. The cleaning of the air filters requires a minimum of fifty to sixty minutes, and on a dusty road it is necessary to clean them at least every two hours.

As a rule, a great deal of time is required by the crews of heavy tanks to service their machines on the march. When moving in the rear as a separate column, it is not difficult to find this time. When, however, the march is made with medium tanks, the matter becomes very complicated.

In this connection, it should be mentioned that the very technique of halting a column

is sufficiently complicated owing to its unavoidable extension. It is sometimes said that in a halt of twenty or thirty minutes the crews find themselves with a lot of time on their hands that they do not know what to do with. This is not entirely true. A tank column is not an infantry column. The tanks cannot be given the command "Halt! Get off the road!" Ten or fifteen minutes at least are required for the halting of a tank column. One reason for the delay which occurs is, of course, that the column is drawn out, and it is impossible for every tank to halt right in the place where it is if the regulations relative to concealment are to be observed. In addition to this, the employment of radio on the march is limited. The issuing of orders by officers also requires time, and there will be little time left for the crews to perform their tasks. All these things must be taken into account in the organization of a march.

The main thing that determines the place of the heavy tanks in the march formation is the necessity for their speedy commitment in order that they may be able to lend assistance to the medium tanks against the enemy tanks and self-propelled guns. On the basis of this necessity, two typical modes of action should be considered. In the first, the heavy tanks are employed for the reinforcement of the tank columns of the advance guard or the main body, with some of them kept in reserve. In the second, the heavy tanks are in the reserve of the senior tank commander and march as an independent column. The employment of heavy tanks for the reinforcement of tanks in a breakthrough action is advantageous because the enemy will attempt to counterattack the units in the breakthrough area with their own tanks and self-propelled guns.

And here is a typical example. An advance guard composed of a battalion of medium tanks reinforced by a group of heavy tanks arrived at an inhabited place and, after overpowering the enemy's combat outpost, occupied it. Moving on to a line of hills, the tanks came up against organized enemy positions defended by all types of armament, including tanks and self-propelled guns. The enemy resisted stubbornly. Then a group of heavy machines, which had hurriedly occupied firing positions after joining the medium tanks, set fire to two of the enemy's assault guns and forced the remainder to withdraw to the western slopes of the hills.

The fight continued. After they had destroyed some twenty of the enemy's guns and about a company of his infantry, the advance guard broke through the enemy defense and occupied the hills. The terrain limited the maneuverability of the main body, and on this account the commander was obliged to use only the advance guard. The availability of heavy tanks in the advance guard permitted a comparatively easy accomplishment of the assigned mission.

The employment of heavy tanks in the capacity of commander's reserve, with the tanks moving as an independent column, is advantageous for the following reasons: the march is accomplished without so many halts, which lower the operational speed of heavy tanks. The commander is able to use his tank reserve en masse at whatever place or time their employment is expedient. In addition, the machines receive better technical servicing on the march. Experience has also shown that the movement of heavy tanks in an independent column involves less expenditure of strength and energy on the part of the personnel. Under these conditions, the average speed of the tanks is increased to that of the medium tanks.

There are, of course, other variations in the organization of marching columns, but we have always employed only the two methods described here. It must be added that they have fully proved their worth. The distribution of heavy tanks in the main column of a formation is advantageous only when there exists likelihood of an encounter with enemy tanks and self-propelled guns and the terrain limits the maneuverability of the machines. If such an encounter with enemy tanks and self-propelled guns is not anticipated, it is more advantageous to have the heavy tanks in a separate column.

Bridging and Rafting to Arnhem

An article in *Aim*, army magazine of the British Middle East Command No. 37, February 1945, and No. 38, March 1945.

HOLLAND, in the autumn of 1944, found the Hun retreating so fast that his demolitions were not always as thorough as they might have been. They were, however, thorough enough to make us glad that we had planned flexibly and exhaustively to cover any situation. The Hun was shaken, and we were following up to try and keep him so. By 11 September the plan was clear. It was nothing if not ambitious. An airborne corps was to land and drop in the Rhine valley. One airborne division would come in from the north, seize the bridges over the Lower Rhine at Arnhem, and hold them intact. Another would capture the bridges over the Waal at Nijmegen, and over the Meuse at Grave. The third airborne division, an American one, was to seize various vital places, including two bridges over the biggest canals between the Escaut Canal (which was the ground troops' start line) and the River Meuse. (See sketch, page 125.)

The ground troops' task was to break out of the enemy ring round the Escaut Canal bridgehead. They would then move rapidly up to join forces with the airborne troops. To do this, they would have to cross (and bridge if necessary) the Wilhelmina, Zuid Willems Vaart, and Maas-Waal Canals, and the Meuse and Lower Rhine Rivers. None of these waterways was less than one hundred feet broad, and the Waal was 1,200 feet across with a three-knot current.

The ground corps would then seize and hold a locality which would cut off all the Huns in Holland from their Vaterland—a task to thrill even this hard-bitten soldiery.

Obviously the Sapper plan was the all-important thing. Quick thought and action, backed up by an admirably trained and efficient RASC [Royal Army Service Corps] bridging column, enabled the RE [Royal Engineers] to fetch up, from such long-forgotten areas as Bayeux and Laigle, the most imposing array of mobile bridging material that the British Army has ever seen.

This mighty concourse of vehicles and equipment assembled in Bourg Leopold, the Belgian Aldershot, now notorious to the Belgian people as a German torture camp.

The RE had been specially trained, long before, for such a task. They had all tackled similar situations on the Seine and had shown their quality. The chief snag was communications, for Army Groups RE are limited in this respect. They had to borrow sets from RA [Royal Artillery]. Corps Signals produced out of the hat enough line and personnel to provide for communication between assembly areas, traffic regulating posts, and bridge sites.

Everything was made as flexible as possible. There were many possible last-minute variations of the order of march, and many different bridge tasks depending on what the Hun might do, and how successful our airborne troops might be. Equipment was therefore allocated to a whole series of columns known by boys' names.

Sapper Columns

You can get some idea of the masses of equipment involved by looking at the composition of one or two columns. "Harry" column assumed that *all* bridges would have been demolished, but that our airborne forces would be in successful occupation; "Harry" had 378 RASC and 500 RE vehicles. Together with "Jim," "Michael," and "Peter" columns, 2,277 vehicles were ready for this situation.

"Spike" column assumed that bridges over various waterways had been blown, but were in our hands. "Spike" had 1,486 vehicles, and his friends "Maurice," "George," and "John" had between them another 2,822. Six more columns were ready to deal with bridges that were demolished but held by the enemy; and a lonely little column called "Richard" was held in reserve in case all bridges were captured intact. All these columns were drawn from army, corps, and division Sappers.

The leading armored division was to do all the bridging over the canals up to the Meuse.

A chosen infantry division would carry out the assault on the main rivers, with its division RE working asasult-boat ferries and constructing the folding boat equipment bridge, while the specially trained RE units in support of it would construct and operate storm-boat ferries, close-support and class-40 rafts, and class-40 bridges.

Airborne Attack

Sunday, 17 September ("summer time ends"), was D-day. The weather was fine, and by morning the airborne forces were on their way. By lunch time the air was full of their fighter cover, and some paratroop carriers, going back with their static lines out, could be seen, though no gliders were visible.

There were two bridges over the Escaut Canal: "Joe's" Bridge (named after the Commander who captured it in a brilliant attack) and a 130-foot Bailey which had been thrown across by night.

At 2.35 PM, troops of the armored division broke out of the bridgehead and crossed the two bridges, preceded by a barrage from almost all the corps artillery and by Typhoon rocket attacks from seven squadrons.

Early that night it was discovered that the bridge at Son over the Wilhelmina Canal had been blown by the enemy before the U.S. paratroops could reach it. But a clear-sighted American paratroop officer rang up the leading British armored patrols on their way up (using a Dutch village telephone system running through enemy lines!) and very soon the American sappers were informing their British brothers that the gap was about 104 feet and that a 110-foot TS Bailey would do the job nicely.

The armored division RE built this bridge by dawn, and the advance went on. Anglo-American teamwork was splendid at all times during this whole operation. Soon another quite unexpected gap over a stream in Valkenswaard had to be bridged, and in twelve hours, under very difficult conditions, the sappers had built a 190-foot class-40 Bailey across stream and crater.

The bridge over the Veghel lock on the Zuid Willems Vaart Canal was captured intact by U.S. paratroops, who improved the shining hours before the British arrived by duplicating it with an excellent little rolled-steel-joist and timber affair.

By nightfall on 18 September we knew that the bridge at Grave was in our hands and that the Nijmegen road bridge was intact, but not yet captured. There was a mass of conflicting news about the state of the Maas-Waal Canal bridges, but not a word about Arnhem.

Next day the RE officer with the corps commander's reconnaissance party sent back a most valuable hasty report about these bridges, which gave us just nice time to get up a welding set and some steel, despite heavy traffic.

Grave bridge had been damaged by shells and bombs only, and the major chords were uncut. The Maas-Waal bridge was more serious, but too little time (or too little explosive) had prevented the Hun from cutting the main members. During the next three days the Grave bridge was repaired and a barge Bailey was put across the Waal.

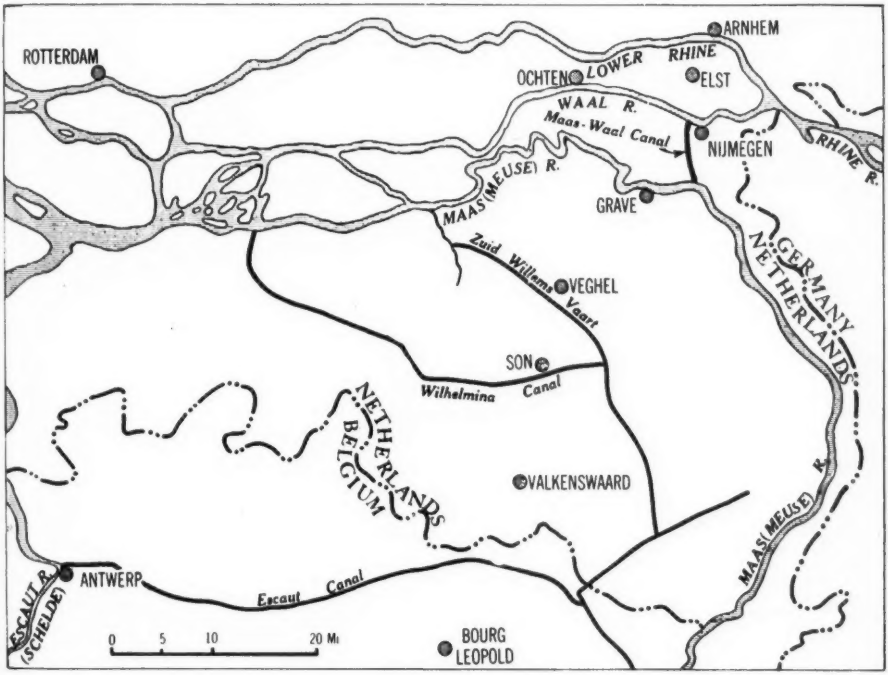
The sappers now got down to it in a big way. There was plenty to do, although the complete original bridging plan had become unnecessary owing to the splendid work of the U.S. airborne division.

Just at this time, however, what we called "axis trouble" began to occur more or less regularly. Determined small counterattacks by the enemy from both east and west disturbed the traffic up our one main route and delayed both sappers and their equipment.

Supplies Were Dropped

On 20 September the ground troops were greatly cheered by the arrival of hundreds of supply aircraft, which filled the blue sky around Grave with an astonishing display of white, green, red, and blue parachutes bearing ammunition and food. A magnificent piece of Anglo-American cooperation between the U.S. airborne division and the British armored division secured the Waal bridges at Nijmegen intact. U.S. Sappers, who had

never seen or handled British assault boats, took them over and ferried a strong force of airborne infantry across the great width and swift current of this main stream of the Rhine, under supporting artillery fire and smoke from the armored division, and rushed



others claim that our assault was too quick to allow German orders to travel down from high authority.

The Hun now began to hit back, however. Shelling and bombing of the bridges began in earnest, and on 22 September a determined

the defenses of the road and rail bridges on the far bank.

After dark, the armored division stormed the enemy strongpoint on the rear bank of the road bridges, and then rushed its tanks across and out into "the island" to form that unforgettable Nijmegen bridgehead over the Waal. The sappers quickly cleared away the demolition charges, many of which were arranged on the main steel members and beautifully painted in the same color.

Perhaps no one will ever know why this immense and vital bridge was not blown. Some held that Dutch patriots cut the leads; enemy attack on the axis prevented fresh Bailey equipment from coming up and also produced a remarkable crop of senior commanders and staff officers, who were stranded in forward areas after being shot down in Auster aircraft.

Next day the leading infantry division followed the armored division over the bridges and established themselves on the south bank of the Lower Rhine some miles west of the Arnhem bridge, which could not be reached as enemy resistance was too strong in that difficult country of dikes and ditches round Elst, where armor had no free maneuver.

In the afternoon the adjutant RE of the British airborne division managed to cross the river and bring us the first real news of the situation near Arnhem. The airborne troops were in great heart, he said, and fighting magnificently, but they had suffered heavy losses in action against superior numbers and were bottled up in a small area west of Arnhem town on the north bank of the river. The bridge was intact but held by the enemy.

Meanwhile the air between Grave and Nijmegen was again full of Allied aircraft in astonishing numbers at an incredibly low altitude, and out of the skies fell another U.S. airlanding regiment, a Polish parachute brigade, more supplies.

After dark on 24 September the Polish brigade was ferried over the lower Rhine by our leading infantry division, to strenghten the airborne bridgehead near Arnhem, but no permanent supply route could be maintained into that narrow perimeter, and we lost over twenty assault boats.

The next night, as all the world knows, the British airborne division and the Polish paratroops were withdrawn from Arnhem to the south bank of the Lower Rhine, covered by a gallant rearguard of two companies of the British infantry division. Now the sappers played their part.

The division RE operated thirty-five assault-boat ferries, while two companies of Canadian sappers worked eight and eleven stormboat ferries respectively. It was pouring rain and a pitch-black night, and enemy crossfire on the river was intense; but the evacuation was carried out successfully, and the stormboats brought out over two-thirds of the men who had been ferried over. Fifteen stormboats and about twenty assault boats were lost—a point worth remembering in future operations like this.

Meanwhile the road bridges over the Rhine and Meuse were being duplicated, and the sappers got the electrical sluice gear of the Meuse barrage into working order to prevent a sudden rise from endangering the pontoon bridge. Finally, a class-40 barge Bailey was built at high speed over the Waal between the road and rail bridges by sappers with special experience of fast-running rivers.

Enemy bombing and shelling of Nijmegen was now getting more intense and accurate. The bridges needed minor repairs, and a courageous party of Dutch civil engineers lent a hand with welding gear and quick-setting cement. Early on the morning of 28 September a German dive-bomber scored the first direct hit on Nijmegen railway bridge—a five-days' repair job.

That night, however, the enemy scored a far greater success. In the small hours of next morning there were two heavy explosions at each end of the main bridges, whose center spans were badly damaged. We had feared and prepared for this emergency, and rafts, DUKW's, and stormboats did their stuff with difficulty until a barge bridge could be opened and some pieces of Bailey put in position. The railway bridge, now finally degraded from its high estate, was converted with timber into a pedestrian crossing.

Those explosions were another mystery. One school maintained that the sappers had not searched very well, and that delay-action charges had been left on the bridge; some attributed it to enemy agents disguised as Dutch civilians; others blamed aircraft parachute mines.

They were all wrong. A few hours later a metal float-chamber was found under the pier of the road bridge, and eight German soldiers in rubber suits were taken prisoner on the bank of the Waal two miles away. They were of fine physique, and were all swimming champions specially trained at Venice for tasks such as this. Twelve of them had swum seven miles down stream to Nijmegen in the dark on a bitterly cold night for four miles between banks held by us.

They had been told there would be a boom obstacle, and shown how to float their mines over it. They found only some wire, which they surmounted, and successfully placed three of their six charges. On their way one man was shot, two died of exposure and ex-

haustion, and one disappeared. The eight survivors swam on, hoping to reach German-occupied Holland at Ochten, but were driven to land exhausted in Allied territory.

As a feat of skill, endurance, and pluck it was a fine performance, and we had to hand it to them. But we learned to watch the river minutely after that, and Henley on regatta night would pale into insignificance compared with the latest Nijmegen flood-lighting and the DUKW parties on river patrol.

Escort

From *Aircraft Recognition* (Great Britain) May 1945.

LONG-RANGE fighter escorts of the Luftwaffe failed to safeguard their day bombers from crippling losses during the Battle of Britain in 1940. Four years later, long-range escort fighters of the United States Eighth and Fifteenth Air Forces made possible devastating bombing in the air Battle of Germany.

The Luftwaffe failed because its escort fighters had insufficient range, because they were flown with inadequate determination, and because they did not have sufficient technical quality. The German bombers, which the escorting Messerschmitt Me 109E and Me 110C fighters tried to defend, were so poorly armed that they could not contribute their essential share in the defensive tactical battle against the Hurricanes and Spitfires of RAF Fighter Command.

The United States Air Forces succeeded where the Luftwaffe failed because the Mustangs, Lightnings, and Thunderbolts have sufficient range—with drop-tanks—to fly to the farthest bounds of Germany with the bombers. They succeeded because these fighters are flown with tactical skill and moral ascendancy. They succeeded, also, because they were technically and operationally a match for the best "airscrew-fighters"—the Me 109G and FW 190D—which the enemy could set against them. Finally, the bombers which the American fighters have been developed to escort can put up a formidable weight of fire power in their own defense.

But for the evolution of the long-range single-seat escort-fighter—in particular, the North American Mustang—day bombing could not have succeeded against Germany. When the first heavy day-bomber groups of the U.S. Army Eighth Air Force arrived in England in the summer of 1942, many people feared that they would suffer crippling losses in deep penetrations over the Continent, powerfully defended by the Luftwaffe. All the experience of the Battle of Britain discouraged day bombing.

At first the heavy armament of the Boeing B-17E Fortress bombers kept losses down in shallow penetrations over France on the "Nursery Slopes." But when, early in 1943, the Eighth Air Force began to fly into Germany by day the losses went up against formidable fighter opposition.

Up to this time the normal assumptions had been that single-engine single-seat fighters could not be made to fly over long ranges without much sacrifice in fighting quality. They could not cope with the enemy's short-range interceptors. A radius of action of about one hundred miles was considered the maximum to be gained efficiently from a single-seater. And so, at first, the Americans turned to other methods of providing the escort for day bombers.

One of the first attempts at escort resulted in the YB-40—a modification of the Boeing B-17E—for escort duties. The YB-40's carried a total of fourteen 50-caliber machine guns in five twin-gun turrets—a chin turret under the nose, two dorsal turrets, a ball turret, a tail turret—and additional waist and nose guns. But the weight of all this armament and ammunition made the B-40's so heavy and so slow that they could

not keep up with the Fortress bomber formation. Although the YB-40's saw action, they did not provide an answer to the problem. Nor did a similar conversion of the Liberator, which became the XB-41.

Only an agile, fast-climbing, hard-hitting fighter, with a performance as good as that of enemy fighters it would encounter, could provide the necessary protection against the Focke-Wulf packs and the multitude of Messerschmitts which the day bombers were meeting over Germany. Spitfires of the RAF and of American groups were able to supply this escort over the first and last parts of long bombing raids. But no fighter could go all the way.

Then came the Republic P-47C Thunderbolts with internal tankage for 307 U.S. (255 Imperial) gallons of fuel—more than twice that of the Spitfire. They were able to accompany the bombers farther than any single-seater before them—Lockheed Lightnings originally intended for the purpose had been diverted to North Africa.

Later the Thunderbolts were equipped with shackles for a 200 U.S. (166 Imperial) gallon auxiliary fuel tank, further increasing their range. The P-47D had wing drop-tanks as well as the fuselage tank, and the radius of action went up to more than 600 miles. And despite its weight, the Thunderbolt, in its succeeding versions, did well against German intercepting fighters. In particular, the twin-engine Messerschmitt Me 110 and Me 410 rocket-firing fighters were no match for the big American single-seaters.

But day-bomber formations were not escorted all the way to and from their more distant targets until the Merlin-powered North American Mustang went into action. The P-51B, which had the British designation Mustang III, began escort duties with the Eighth Air Force over Germany in January 1944, and had a longer range, higher speed, and higher ceiling than any other contemporary type. Later versions, the P-51D (Mustang IV), still further increased this performance and the Mustang remains the fastest airscrew-fighter in service anywhere in the world.

By the beginning of 1945, Mustangs were providing almost all the escorts for American day bombers of the Eighth Air Force. More than 700 Mustangs have flown out on escort duties on many days in succession. Thunderbolts form a very small proportion of the escort forces for strategic bomber formations, being chiefly reserved for use with the Tactical Air Force and gaining much success as fighter-bombers and as ground strafers with rockets.

Mustangs and Lockheed P-38J and P-38L Lightnings were used almost exclusively as escorts for the strategic day bombers of the U.S. Fifteenth Air Force flying from Italy. The P-38L has extra fuel tanks in the leading-edges of the wings as well as large drop-tanks under the center section.

Most recent of all escort day fighters is the Republic P-47N Thunderbolt which has a redesigned wing of slightly bigger span and modified plan-form. It has about as long a range as any single pilot can be expected to use effectively.

Indeed, the increase in the length of escort missions which will come from a transfer of the bombing focus from Germany to Japan, shifts the major escort problem from the mechanical to the human element. Escort fighters have now been developed to an extent at which they try human endurance to the limit. And so we may see a return to the high-performance two-seat escort fighter.

In this category the de Havilland Mosquito has already done good work, not only by day but also in the new technique of night escort fighting. Much more will be seen of the Mosquito in its various developments in the Pacific.

Movement is the rule of strategy.

—Foch

XUM

MILITARY REVIEW

ENGLISH EDITION

Starting with the April 1945 issue, the Command and General Staff School broadened its scope by publishing the MILITARY REVIEW in three languages, namely English, Spanish, and Portuguese.

The articles that appear in the Spanish-American and in the Brazilian editions will be found that same month in the English edition.

This notice is to acquaint our readers with the fact and to insure our Spanish-American and Brazilian neighbors that it will be our most sincere endeavor to translate the English text faithfully, and to produce, to the best of our ability, a magazine that is authoritative, informative, interesting and instructive.

The Editors

EDICION HISPANOAMERICANA

Con el número del mes de abril de 1945, la Escuela de Comando y Estado Mayor amplió sus actividades con la publicación de la MILITARY REVIEW en tres idiomas: español, portugués e inglés.

Los artículos que se publican en las ediciones hispanoamericana y brasileña aparecerán en la edición norteamericana del mismo mes.

Por medio de estas líneas, deseamos hacérselo saber a nuestros lectores y, asegurarles a nuestros vecinos de Hispanoamérica y del Brasil, que dedicaremos nuestro más sincero esfuerzo a traducir con exactitud la versión inglesa y a presentar, de acuerdo con los medios a nuestro alcance, una revista autoritativa, informativa, interesante e instructiva.

La Redacción

EDIÇÃO BRASILEIRA

Com o número do mês de Abril de 1945, a Escola de Comando e Estado Maior estendeu seus horizontes com a publicação da MILITARY REVIEW em três idiomas, o português, o espanhol e o inglês.

Os artigos publicados nas edições brasileira e hispano-americana aparecerão tambem na edição em inglês do mesmo mês.

Êste aviso tem em vista dar conhecimento dêste fato aos nossos leitores e assegurar aos nossos vizinhos brasileiros e hispano-americanos que serão envidados sinceros esforços na tradução do inglês, para apresentar-lhes com os meios ao nosso alcance, uma revista fidedigna, informativa, interessante e instrutiva.

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